THE OFFICIAL ARMY INFORMATION DIGEST

U.S. ARMY MAGAZINE

SEPTEMBER 1959

WHAT IS A MODERN ARMY

ARMY
INFORMATION
DIGEST

THE OFFICIAL MAGAZINE OF THE DEPARTMENT OF THE ARMY

The mission of ARMY INFORMATION DIGEST is to keep personnel of the Army aware of trends and developments of professional concern. The Digest is published under supervision of the Army Chief of Information to provide timely and authoritative information on policies, plans, operations, and technical developments of the Department of the Army to the Active Army, Army National Guard, and Army Reserve. It also serves as a vehicle for timely expression of the views of the Secretary of the Army and the Chief of Staff and assists in the achievement of information objectives of the Army.

Manuscripts on subjects of general interest to Army personnel are invited. Direct communication is authorized to: The Editor, ARMY INFORMATION DIGEST, Cameron Station, Alexandria, Va.

Use of funds for printing this publication approved by Director, Bureau of the Budget, 8 May 1957.

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THE ARMY as Defender and Builder: To help insure survival of our Nation and the Free World, the Army must achieve modernity in relation to any possible future foe, as highlighted in a special section. Meanwhile, in pioneering efforts such as the Alcan Highway and Great Lakes waterway, the Army builds enduringly for a peaceful future.

COMMAND LINE

Army Views On Vital Issues

ON FIRMNESS AND RESOLUTION

"The firm stand taken by the United States in the face of Communist provocations or outright aggression in Greece, Korea, the Taiwan Straits, Lebanon, and West Berlin has inspired faith in the hearts of millions who look to us for leadership, and has made a profound impression upon the peoples of the uncommitted nations who, in the not too distant future, may wield the world balance of power.

"We have demonstrated our steadfast adherence to the principle that armed force shall not be used for aggression anywhere on earth. We have proved beyond the possibility of an honest doubt on the part of anyone that we will not submit to a "shakedown" by the Sino-Soviet conspirators—that we will not betray those who trust us—that we will not abdicate our rights, nor shirk our solemn responsibilities in any particular because of Communist threats and denunciations."

Secretary of the Army Wilber M. Brucker before the Association of Commerce, Baltimore, Maryland, 11 May 1959.

ON FREE WORLD STRENGTH

"[The Military Assistance Program] is anything but a one-way street wherein Uncle Sam picks up the tab. In the years 1950 to 1958, the United States has furnished military assistance to our Allies in the amount of 22 billion dollars. In the same period these Allies have spent approximately 141 billion dollars of their own money in our joint defense efforts. Further, it is interesting to note that about 85 per cent of our military assistance funds has been spent here in the United States for equipment. Thus, a major share of this tremendous sum has been plowed back into our own economy and the people of our country, in major numbers, have been employed in the production of the equipment."

The Honorable George H. Roderick, Assistant Secretary of the Army (Financial Management) before the Rotary Club, Portland, Oregon, 12 May 1959.

ON THE TEST OF WEAPONRY

"No weapon system development is worth our time or the taxpayers' money unless as an end product we will hqve a system that is effective when it hits the field and for a reasonable period thereafter, that is usable by the troops, and that is economical when weighed against its value as an instrument of combat."

Major General J. B. Medaris, Commanding General, Army Ordnance Missile Command, at the Industry Missile and Space Conference, Detroit, Michigan, 16 June 1959.

FEATURES

BRIEFS

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Defining the problem and area of decision is a vital requirement in determining

What is a Modern Army?

Foreword

BEFORE General Maxwell D. Taylor retired as Army Chief of Staff, he issued his Biennial Report to the Secretary of the Army which delineated not only what had been accomplished during the years 1957-59, but also what had not been accomplished—largely due to lack of funding support—toward making the U. S. Army modern in comparison to its greatest potential enemy.

That report was a sweeping and profound document which will serve as a guideline to the Army through the coming years. Published in the August issue of *Army Information Digest*, it is a document to be read and studied by every American citizen, as well as by all military men.

In it, commenting on the Army's modernization needs, the retiring Chief of Staff pointed out, in essence, that—

"To be able to move through enemy resistance at will, even small units require readily available firepower, including atomic firepower . . ."

". . . A degree of mobility which will permit commanders to shift forces rapidly by land or air" is essential.

"Control of the rapidly moving, small units . . . over wide areas requires more effective communications and control equipment than has been available in the past."

". . . Equally critical problems and requirements in strategic and global communication and electronic systems beset the Army."

". . . The Army's need continued to grow for personnel with advanced levels of academic training."

In discussing the need for modernizing the U. S. Army, the question might well be raised—just exactly what *IS* a modern Army? Just exactly how does the U. S. Army measure up and where does it lag in being modern? And further—what actions should be taken in the pursuit of modernity?

Believing that the answers to these questions are of vital concern to all who have the national security at heart, *Army Information Digest* has asked the various Army General Staff agencies for facts, comments and planning bearing on these questions.

From the mass of material received, it is possible to delineate a picture of the situation which should bring about a better understanding of the Army's problems. It is a picture at once heartening and sobering—of a dedicated organization maintaining troops on a world-wide dispersed front ready to fight today if need be, of an organization planning for the type of warfare it may have to fight in the nuclear age, of an organization whose doctrine, concepts, research and development outstrip the material actually being delivered to carry out the doctrine and concepts.

The following, based on this material, highlights the Army's present posture, its plans and its aspirations toward becoming a truly modern army.

DURING the early days of the Korean War, United States troops found that the World War II-type rocket launchers with which they were equipped could not knock out the Russian-developed tanks employed by North Korean forces. Nor could the tanks then in hands of U. S. troops match the armor employed by their foe.

Suddenly and dismayingly, the Army which had enjoyed a superiority of weapons a brief five years previously in World War II was no longer modern in comparison with its enemy. In the case of the rocket launchers — the popularly titled bazookas—modernity was quickly restored when the new 3.5-inch weapons could be flown from the Rock Island Arsenal where they had been developed. But it was quite another matter to be flying tanks to Korea—even had they been in production.

This dual incident epitomizes the problem of maintaining a modern Army; at the same time, it illustrates the dangers of not being modern. It leads, also, to a definition: A modern army is one whose doctrine, organization, personnel, and logistical support systems, as well as its ability to shoot, move, and communicate, are constantly being raised to higher levels of effectiveness by the practical application of discoveries in all fields of thought and technique, so that at any time and in any land environment it can operate with greater combat effectiveness than its actual or potential enemies.

IN considering the entire problem, it is necessary to note at least briefly what the combat effectiveness of our "actual or potential enemies" may be. Today the United States, as leader of the Free World, faces the possibility that the Sino-Soviet block, whose aggressive designs are now manifested primarily in the political and economic sphere, may at any moment turn to principal reliance upon military means for pursuing its objectives. That bloc forms our greatest potential enemy.

Today the Soviet Army has under arms a force of 2,500,000 men, including 175 line divisions. Its Army Ground Forces have been re-equipped with newly developed tanks, guns, missiles and efficient means of tactical movement by land, air or water. It is known to be prepared for, or to be preparing for, operations ranging from indirect aggression aimed at subversions of governments, through all shades of nuclear-supported war.

Red China also maintains a large and increasingly efficient army. At the same time, the satellite states

maintain large armed forces whose combat effectiveness may be open to some question, but whose potential certainly cannot be discounted. All in all, some 8,000,000 men in 400 ground divisions are under arms in the Sino-Soviet Bloc. Russia alone could have 14,000,000 men in 500 divisions operating within a year in case of war.

In contrast, present strength of the U. S. Army is approximately 870,000. Meanwhile, the Army has reorganized its existing active divisions and is constantly studying doctrine for their employment in any type of future war. It also is engaged in constant research and development efforts to provide the weapons and equipment that would be most effective under nuclear war conditions. All of this planning and organization also is being extended to Reserve organizations. The U. S. Army also is assisting allied armies to the fullest extent possible.

Today then the status of the U. S. Army is one of an efficient force, with doctrinal, organizational and training concepts well fitted to existing arms and equipment—but whose concepts and planning for modernization are far in advance of actual production of the latest and most modern arms and equipment. The stubborn fact is that the physical weapons, equipment and accepted doctrine as reflected in our ready forces are too far behind what our vision indicates is necessary, and what our science and technology could provide if permitted to do so.

In one sense the goal of becoming a truly modern army is never fully obtainable, for the swift march of

THE MISSION OF A MODERN ARMY

"It is the intent of Congress to provide an Army that is capable, in conjunction with the other armed forces, of (1) preserving the peace and security and providing for the defense, of the United States . . . . (2) supporting the national policies; (3) implementing the national objectives; and (4) overcoming any nations responsible for aggressive acts that imperil the peace and security of the United States." ***From section 3062 (a) Title 10, United States Code***

IN THE nuclear age there has been a great deal of confusion as to whether an army still has a real role in defense of a nation. It is important that this confusion be eliminated if an army is to receive the essential support of the people it represents. The people, for their part, must realize the nature of the Army's role in their defense—and must insist that it be prepared to perform that role with the best the nation can provide.

Actually, while there have been many changes in the means and methods of applying military power, the fundamental role of armies has not changed. That role is to engage in prompt and sustained combat in the land environment. *Nothing has occurred which eliminates or even reduces the requirement for an army to perform this role.*

A pattern is emerging from the welter of crises which make up the world situation of today. The Soviet Union has embarked upon a series of bold and provocative ventures designed to test the will and ability of the West. In these ventures the Communists are exploiting the full span of war, including cold war and indirect aggression. Their forays on the ground are increasingly bold. Beyond doubt, they have concluded that their newly recognized ability to wreak incalculable damage through nuclear attack on the United States has expanded profoundly the limits within which they can pursue their program of imperialistic expansion.

It is to the Army that the United States must look if these provocations on the ground are to be met. A modern army can cope with local aggression by means appropriate to the scope of the aggression, without

technology renders weapons and equipment obsolescent, often before they can be produced in quantity. And new concepts and doctrines must keep pace with technological advances—in fact, *must* keep ahead of them.

While it is possible—as is indeed now being done—to evolve concepts and doctrines for future warfare, often it is impossible to test the proper application of such doctrines and concepts when the actual weapons and equipment are lacking. And obviously, unless the fighting men who comprise an army can be trained in their use, such arms and equipment would be of small value even if they could be produced quickly in emergency.

Doctrinal Developments

TODAY, many changes in Army doctrine stem directly from the technological revolution now taking place in all scientific fields. Each new weapon or innovation requires a corresponding development of doctrine, tactics and techniques. At the same time, development of operational concepts and doctrine can dictate new research and development projects, and also indicate both quantitative and qualitative materiel requirements.

Development of Army doctrine also must take into consideration the programs of the other Services. It must insure that changes in Army doctrine are compatible with and complement doctrine for joint operations. All three services must

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plunging the world into a total nuclear war.

In the cold war, the Army can exert a stabilizing influence through preventive deployments. The physical presence of armed men on the ground is tangible and unavoidable evidence of the will to preserve freedom.

In actual conflict there is still—and always will be—a need to control and direct military force so that it leads to the attainment of national political objectives. Without such objectives military force becomes a juggernaut, a senselessly destructive monster which destroys friend as well as foe.

The Army is capable of conquering without destroying, of defending without reducing the defended land to radioactive waste. The physical presence of armed men on the ground can exert more effective and lasting control than the threat of megatons of firepower that will never be used.

Although the Army's role in cold war and limited war is not perfectly understood by the public, the utility of the Army is least appreciated in the case of total nuclear war. In the public mind the Army has been submerged by the emphasis which has been placed on the initial nuclear exchange that would attend a general war. Although chaos and destruction would result from such an exchange, civilization would rise from the wreckage and its character would be determined by whoever controls the wreckage in the immediate aftermath.

An Army is the service which is least dependent upon machines, weapons or paraphernalia, sophisticated or otherwise. Even without machines, it can achieve positive results. It is the most resilient and the most adaptable to cope with chaos. Thus it is essential to the security of the United States that it possess an Army to cope with the problem of controlling chaos that would follow a nuclear exchange, and be capable of defeating the surviving elements of the enemy.

Regardless of the future course of the existing power struggle, lack of an adequate modern Army could prove fatal to the security of the United States. The Army is not a force which must be maintained solely to produce a stalemate, however. It could well be the decisive factor in winning the cold war, or in winning such limited conflicts as may occur, or in bringing total nuclear war to a conclusion which will preserve the security of the United States.

devise compatible means for use in amphibious, airborne and other joint operations.

To date, certain concepts have been evolved on which Army doctrine for future warfare can be based:

- *In future wars involving major powers, tactics will be based on threatened use of high-yield nuclear weapons, even if they are never used. At the same time, constant consideration must be given to the possible use of low yield tactical nuclear weapons by both forces.*
- *There will be vast increases in range and lethality of all weapons whether conventional or nuclear, with missiles giving artillery commanders vastly increased ranges.*
- *Possible employment of nuclear weapons will increase the need for tactical and strategic mobility, more accurate firepower, increased ability to locate targets, more efficient command control and more intensive battlefield surveillance.*

Given such concepts, it is possible to evolve doctrine for tactical actions on the battlefield of tomorrow, whether it be in an all-out "general" war or a limited war.

THE requirements for modern warfare now are visualized as a spectrum ranging from a low extreme of operations conducted against lightly-armed irregular forces to total nuclear warfare. The Army, as the organization for land warfare, must be prepared to meet either extreme or any of the intermediate levels of armed conflict.

Currently, then, Army doctrine is based on tactical concepts presuming neither the use or non-use of nuclear weapons, and its organization is founded on the basic proposition that it can conduct combat operations in either a nuclear or non-nuclear environment.

Introduction of tremendously increased firepower, plus the numerous scientific advances of the past several years require that tactical combat operations be conducted by dispersed, powerful formations capable of extreme maneuverability.

The combat zone of the future will be vastly extended in both width and depth as a particular antidote to the tremendous firepower and weapons technology now available. Areas not occupied by troops must be under constant surveillance by a variety of means. Combat action will be characterized by fluidity of movement with rapid concentration of widely dispersed units for violent attack, followed by equally rapid dispersion and deep exploitation.

Mobility of the first order will be required for both ground and air vehicles, with use of Army Aviation a normal means of combat transportation for the forward striking forces. The offense will be launched so swiftly and forcefully that the defender will have only limited opportunity to damage the attacking forces during the period when they are converging.

Objectives will be deep and aimed at destruction of the enemy's combat power. Logistical installations will be broken into segments and dispersed into smaller, mobile supply points. Austerity of supply will be the norm, with rapid and

direct resupply the goal. The whole support complex will be integrated and controlled through advanced means of automation.

From all of this, then, there emerges a certain well defined pattern of the Army's needs in its quest for modernity. It must have

- pronounced improvements in tactical and strategic mobility
- continually improved ability to deliver accurate destructive firepower
- reduced vulnerability to enemy action
- improved means to find targets quickly
- superior means for rapid command control and surveillance
- completely mobile support
- doctrine developed and refined to support action at the lower end of the spectrum of conflict.

Above all, there must be widespread realization that concepts cannot remain frozen or doctrine rigid. The Army must plan for the future with a judicious mixture of past experience, sound judgment and vivid imagination.

Organization

GIVEN the concepts and doctrine —and always remembering that technology and doctrine interplay one on the other—it becomes evident that in modernizing itself any army must be properly organized to fight within the framework of the doctrine that it has developed, and with the tools provided.

The U. S. Army has taken a farsighted step toward this goal in adopting the new Pentomic Division concept of organization. In place of the old form of three regiments, five battle groups are provided. Each is so organized and equipped that it can operate to a great extent as a self-contained, self-sustaining unit.

This means that the commander can meet the requirements, as now foreseen, for small units operating more or less independently over wide areas. They can be combined rapidly to form a heavy striking force, then can be dispersed to eliminate any concentrated targets profitable to the enemy.

Army planning, however, emphasizes that the new Pentomic organization is not the ultimate, but rather merely the beginning of adaptation to nuclear age warfare. Further reorganizations will proceed as new technological developments and changing concepts of warfare may dictate.

At present, to back up its widely deployed forces along the Iron and Bamboo Curtains, the Army has organized three of the new Pentomic Divisions and several other combat and support units into the Strategic Army Corps (STRAC) —hard core of the Strategic Army Force (STRAF) which now consists of seven divisions and supporting units in Continental United States.

The STRAC concept is one of readiness, mobility and a wide variety of firepower, all capable of immediate response to aggression. This response would take the form of swift movement to encounter a limited war situation, or to reinforce our troops and allies abroad in case of a general all-out attack on this Nation.

Modernization requirements in the area of organization call for

accelerated activities to keep pace with advancing technology, continual reappraisal of manpower requirements and training, and improvement of long-range mobility through intensified efforts by Army, Navy and Air Force to solve the problems of rapid strategic movement of Strategic Army Corps (STRAC) forces.

Personnel

AS A result of the dramatic upsurge of new weapons, there often is a tendency to think of the Army primarily in terms of items—missiles, rockets, atomic warheads, aerial personnel carriers, airborne guns and tanks, flying platforms and all sorts of electronic devices—which have captured the imagination of military men and the public alike.

But in the final analysis it is MAN, the indispensable, who still must operate these weapons and use this equipment, who must meet the enemy on the ground, defeat or annihilate him and occupy his territory. Combat effectiveness will always be the product of men, equipment, organization and doctrine. And of them all, MAN is the most important.

History is replete with examples of determined, dedicated, well-trained forces who have triumphed over better equipped, larger armies. The advent of the electronic-nuclear-space age has actually enhanced the importance of the human element since it has introduced new dimensions to the problem of properly employing our human resources. Unless these factors are given proper consideration, the U. S. Army can scarcely hope to reach its full potential.

Two factors are involved in any discussion of manpower in modernizing the U. S. Army—first, that of securing and retaining the best available personnel, and then of training such personnel to use the new weapons and equipment within the organizational framework developed to meet Army doctrine.

A major problem that must be considered in procuring and retaining manpower is insuring that sufficient numbers of men and women are available with the required aptitudes and basic skills to permit introduction of the complex weapons now being evolved for the modern Army. We must also be certain that the required skills and aptitudes are identified in or developed from our manpower pool to permit the most

effective utilization of high quality personnel. We must also develop the small unit leaders necessary to command the type of combat units envisioned for the near future.

Much of the current effort of the Army Human Research Program is devoted to solution of leadership problems. Research embraces a variety of tasks which seek to improve identification and selection of commissioned and noncommissioned officers. In addition, much effort is aimed at developing leadership training programs and suitable proficiency tests. New selection tests have been introduced which result in better motivation and may enhance leadership potentials.

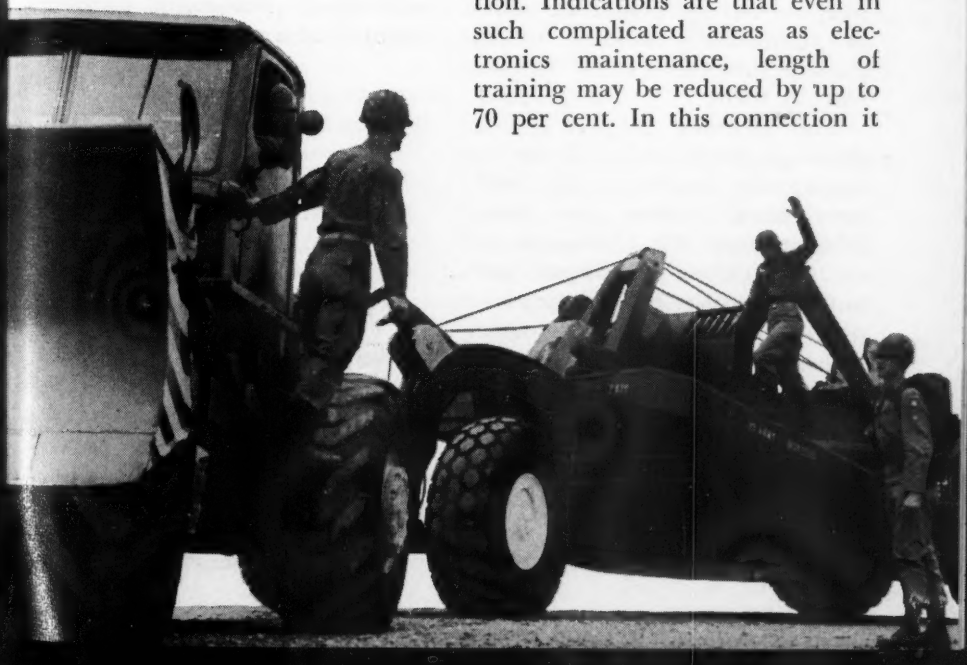
Satisfactory screening devices must also be developed which will insure that the combat-unfit are assigned to units where they will be properly utilized.

Screening out the combat-unfit is a challenging problem in the area of social and psychological research. Important findings have been achieved which will affect significantly the fighting quality of combat units. The Army has developed a Combat Aptitude Test which will aid in identifying the combat-unfit, and is developing programs that will assist soldiers generally to withstand the disorganizing effects of combat stress.

The foregoing efforts, it should be pointed out, are all based on a fundamental faith in the character and rugged adaptability of young American manhood.

PROBLEMS of training Army manpower have increased enormously, both as weapons become more complex and as concepts of nuclear-age warfare call for greater utilization of smaller units. It is obvious, then, that revised concepts of training are needed, both to reduce length of training courses and to provide the skills and fighting spirit necessary to operate the new arms within the framework of latest doctrine.

The Army training research program has developed both improved curricula and methods of instruction. Indications are that even in such complicated areas as electronics maintenance, length of training may be reduced by up to 70 per cent. In this connection it



is also noteworthy that intensive research and development in many fields is producing simplified items of equipment that require considerably less maintenance—thus reducing the need for skilled technicians in maintaining the items.

Because new weapons are so expensive and so lethal, frequently it is too costly or too dangerous to use the actual items in training. Consequently training devices and simulators have become a necessity. Some outstanding results are already apparent, as in the field of missile simulators. Still another concept involves leadership trainers in which the battlefield environment is portrayed realistically in the classroom to permit accelerated command and staff training.

HUMAN ENGINEERING is becoming of increased importance in developing both new weapons and tactical doctrine. Besides insuring that weapons systems do not become too complex for the psychological and physical limitations of the men who will operate them, weapons and equipment items must be scientifically tailored to the physical limitations of the men who will use them.

The technical services are increasingly emphasizing the human engineering factors in the entire development process, from design through user test. Weapons and doctrines cannot be accepted without evaluating their impact on qualitative manpower requirements, on training, and on leadership problems.

Acceptability of weapons and doctrine must be keyed to the capability of men to serve effectively under adverse conditions of mud, cold, heat, fear and confusion normally imposed by combat. If new concepts impose demands greater than can be met in terms of aptitude, training, leadership and psychological considerations, then such concepts must be rejected.

From a personnel standpoint, an army can be truly "modern" only when its men and women form a dedicated, competent body, aware of the vital importance of their mission and confident of the support of the public whom they serve. Conditions of career service, including pay, housing, and personnel management, must attract and retain the type of manpower essential in a modern army.

Substantial advances have been made in recent years in these areas. Outstanding have been the pay legislation of 1958, the adoption of the Army Enlisted Management Program, and increased in-service educational opportunities for both officer and enlisted personnel. While the progress made has been gratifying, continued successful efforts in this field are needed to build and maintain a professional force—an essential of a modern Army.

Weapons and Firepower

TO MEET the entire spectrum of possible threats from local police actions to all-out war, the United States must maintain a selective arsenal which can be used with discrimination against all manner of targets. Our Nation's tremendous potential for world leadership will not be realized if our military means is limited to the ability to blast an adversary from the earth. In the majority of current weapons systems, conventional weapons and missiles are complementary, rather than competitive.

The lag between planning and production is of great importance in this area. It is complicated by the fact that technological progress poses a dilemma: Whether to accept a new weapon with significant improvements over the old, or to wait an indeterminate period for a truly major improvement. On the one hand, better weapons might be made available with but little delay. But on the other, to do so can prove extremely costly since a major improvement would render the accepted weapons completely obsolete.

Two countermeasures are being taken to escape the horns of this dilemma. They involve continuous efforts to compress the time from concept to issue; and the establishment of long-range requirements even though such objectives may not appear feasible within the current state of the art. For to limit developmental objectives to those which appear feasible today will only make the development of obsolete weapons a virtual certainty.

It is obvious of course that the same problem and same dilemma exists in production of all "hardware" items—in the fields of mobility and communications, and to some extent in other areas such as engineering items, clothing and the like.

Tremendous strides have been made in research and development, both Army-wide and by the various branches in all of the fields of weaponry, communications, mobility and others. But planning for the various items and bringing them to the stage of acceptance still is not placing them in hands of troops. If the gap between requirements imposed by our concepts and our present capabilities persists, the U. S. Army will labor under an increasingly heavy handicap in becoming a decisive force for implementing national policy.

Weapons ranging from small arms to tactical missiles have been developed which would provide the Army with the ability to produce any desired or needed degree of force to meet varying conditions. However, some are not yet in the hands of troops and others are being produced slowly due to lack of funding.

Individual and Battle Group Weapons. In the small arms weapons system, the recently standardized M-14 rifle-machinegun system has been accepted—but it will take some time to fully equip the Army with this superior weapon. The M-14 is designed to replace the existing M1 rifle, the carbine, the Browning Automatic Rifle and the M-3 submachinegun. Utilizing the new, light 7.62mm NATO cartridge, the M-14 will simplify logistics.

A similar advancement is the new M-60 machine gun which will replace several existing machine guns.

Under a program known as SALVO, research and development in the field of small arms is being pushed for an all-purpose hand-held weapon that could deliver selective fire ranging from small caliber bullets to nuclear rounds of fractional kiloton yield. This quest well illustrates the dilemma mentioned above, for should the Army await such a weapon, it could easily find itself far inferior in soldiers' hand weapons—yet its production would render obsolete even the excellent M-14 and probably the M-60 machine gun.

Significant advances have been achieved in the field of recoilless weapons, both in range, accuracy and lethality. Several types of recoilless rifles are being standardized as the M-40 rifle system, a big step forward in range, weight, lethality and simplicity. Limited procurement of the weapon has been initiated. However, continued advances in armored vehicles possessed by our potential enemies make it mandatory to improve even this advanced system.

The 3.5-inch bazooka mentioned earlier was an improvement over World War II items, but already it is obsolescent, and a new shoulder-fired recoilless anti-tank weapon with more power and greater range is being developed.

Progress in mortars, flamethrowers, mines and grenades has been limited, due to lack of funding support coupled with the emphasis accorded to the more dramatic weapons. In view of the essential part such items play in combat operations, a reassessment of them may not be inappropriate to insure that major effort is directed from front to rear, with stress on firepower within the battle groups.

Necessary to modernization is the provision of flexible and efficient weapons and ammunition to provide sufficient firepower to defeat a numerically superior enemy. Emphasis should be placed on developing mobile weapons platforms, combat personnel carriers and aerial vehicles mounting the weapons organic to the battle group. These would enhance the flexibility, mobility and firepower necessary to cope with any type warfare.

Armor Weapons Systems. Because of their unique capabilities, firepower and shock action of

Tactical effectiveness of recoilless rifle mounted on Mechanical Mule is studied under test conditions at Fort Ord, Calif.

Incorporating new and advanced components, the new M-60 tank will carry a 105mm gun capable of defeating any known armored vehicle.

mounted weapons protected by armor will continue to influence the course of any future battlefield. The current main battle tank, the M-48, is a pronounced improvement over the tanks of Korea but again, as with the M-14 rifle, a new tank has been developed but is not in full production.

The new M-60 is a long step forward in the Army's search for reduced weight and lower silhouette, improved operating range, lower fuel consumption, increased firepower and improved crew visibility. It is diesel powered, fires highly improved ammunition from a 105mm gun—compared to the 90mm gun of the M-48—and because its frame is similar to that of the M-48, it will allow conversion of existing tanks. The M-60 also will replace the heavy tank, M-103. Thus together with a new light tank under development—called the T-92—an excellent family of tank weapons is in prospect.

Besides the actual vehicle, however, there is an urgent requirement to provide armor with the ability to fight under any conditions of visibility. Ideally the Army is seeking a single system of armored vehicles which would combine capabilities of the current systems and be capable of fighting under all conditions.

Conventional Weapons. Introduction of atomic warheads, rockets and guided missiles has posed many complex questions as to the proper balance between these new systems —employed by the Army as a logical extension of the conventional artillery—and of conventional artillery itself. Numerous analyses and tests have demonstrated that at the present and foreseeable level of technological advance, there is a requirement for *both* missiles and conventional artillery.

Cannon still are needed to provide the commander with exactly the degree of firepower needed. The barrelled type weapon is still superior in accuracy, reliability, rate of fire and responsiveness. While conventional artillery now in use is not substantially different from that of World War II, its capability has

been markedly increased through improvements in ammunition and the development of an atomic shell for the 8-inch howitzer and 280mm gun.

To meet Army modernization requirements, artillery weapons systems must be made more mobile and air transportable; self-propelled weapons with nuclear capability for both infantry and armor formations must be produced; better fire direction computers must be phased into operational units to replace manual fire direction methods.

One step in meeting requirements for a direct support weapon is the T-196 self-propelled carriage for the 105mm howitzer. Equipping armored divisions with this new carriage will go far toward providing the mobile close-in fire support needed.

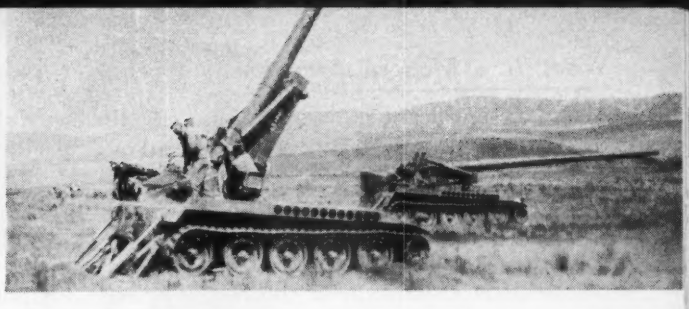
A self-propelled carriage also is being developed which will be interchangeable for the 8-inch howitzer and the 155mm gun. A new corps counterbattery weapon, a 175mm gun, is undergoing tests. It can be mounted on the same carriage as the 8-inch and 155mm gun, and may eventually replace both weapons.

Additionally, numerous projects for improved ammunition, rapid survey and target finding and fixing devices are under way.

While all these advances have been made and others are under research, again the problem of production in quantities sufficient to supply troop units creates a lag between plans and actual availability of the items.

Missiles. Ground-to-ground missiles—whether equipped with conventional or nuclear warheads—extend the range of conventional artillery and would be used in much the same way as barrelled weapons to support ground troops.

Existing missiles, however, are not as accurate as artillery and are more expensive to use. Whereas a commander would not hesitate to employ a $100,000 missile on a target susceptible to an atomic attack, he would still hesitate to use the same weapon with conventional warhead where he could do the job with less costly cannon.



"Cannon still are needed to provide the commander with exactly the degree of firepower needed." Shown here are 8-inch and 175mm artillery in firing position.

While the Army has made a creditable start in providing itself with a missile atomic delivery capability, it is by no means satisfied with its family of three operational systems now in troop use. These are the Honest John, with a range of some 14 miles, the Corporal with a 75 mile range, and the 200-mile Redstone.

Ideally, because obsolescence occurs faster in missiles than any other type of weapon, a three-phase program is essential—a system in hands of troops, one under development, and another in early planning stage. Thus the heavy, short-range Honest John will be replaced with Little John to provide a highly mobile system for airborne or air transported operations. Corporal, an expensive and complex weapon, will be replaced by Sergeant which is solid-fueled, thus easier to handle and maintain. The recently announced Lacrosse will provide pin-point accuracy necessary for small-yield delivery close-in to friendly troops. The new Pershing, when available, will replace the Redstone and provide the army field commander with a missile of significant range capability and a relatively lightweight weapon that ran be easily supported logistically.

Research and development is proceeding to provide missiles that will replace this second family. It is because of the obsolescence problem that a reduced budget has such an impact on the Army's surface-to-surface missile program. To meet a reduction in funds, there are two theoretical courses of action, neither of which is particularly attractive. In these circumstances the Army can:

a. Develop an advanced family of missiles with a view to replacing the present family as promptly as possible.

b. Stretch out the development of the advanced family and produce more in-being weapons to meet any immediate threat.

In the first instance, a reduction or stretch-out in production of "in-being" missiles would result—a course that places a premium on quality and gambles that there will be no war until at least the new advanced family is available.

The second course places a premium on present capabilities—but accepts a longer operational life of present weapons.

In its quest for modernity in this area, then, the Army must accept the fact that the period of usefulness of any given missile system will be relatively short. Accordingly, we must be prepared to pay relatively more to maintain the quality of the existing arsenal than we have in the past for so-called conventional weapons. This quality differential would give the U. S.

Army a significant advantage on the battlefield.

Atomic Munitions. Even in the case of a non-atomic war, the Army requires a stockpile of atomic weapons to deter expansion of the conflict—or to be prudently prepared in case of its expansion. The stockpile should contain a large number of small, light atomic weapons with yields from sub-kiloton to the small megaton weapons.

Capability must exist to meet any situation that would require large numbers of atomic weapons to fight on the dispersed battlefield of the future. This need is enhanced, further, by the requirement to maintain atomic weapons for possible use in atomic-capable delivery systems provided under the Military Assistance Program to our NATO allies.

In addition, large numbers of this type weapon are required to discharge Army responsibilities for air defense.

As far as possible, weapons should be pre-located where they might be needed, since it would be too late to distribute the weapons after an all-out assault had begun. Unavoidably, this results in distributing more weapons than might actually be employed. This problem is particularly acute in case of air defense weapons.

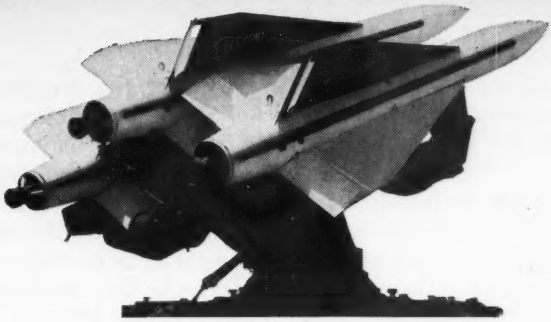
These nuclear munitions, it should be emphasized, are not only for rockets and missiles, but for the 8-inch and 280mm artillery. Research and development is centering on providing smaller, lighter, more mobile and less expensive warheads. Advantages would include shorter reaction time in placing fire on a target, lighter launchers resulting in greater mobility, and reduced logistical problems. Above all, smaller, lighter warheads would mean cheaper missiles and make possible simple weapons systems that could be man-handled by small crews. Greater range would be obtained in a missile of the same cost. All of this would enable Army forces to apply atomic firepower with discrimination, accuracy and economy in their own close support and with minimum threat to noncombat populations.

Air Defense

RAPID advances in aeronautics which produced aircraft capable of supersonic speeds at high altitudes has made necessary the transition from antiaircraft cannon to missiles for air defense. United States population and industry, as well as the armies in the field, must be protected from devastating air attack. This is an important part of the mission of the U. S. Army.

Today the swiftly advancing specter of intercontinental ballistic missiles creates new and more complex problems in defense. Fundamental questions concerning the entire concept are frequently heard in the public press and the halls of Congress: Is air defense worth the price? Should we not put the air defense dollars into retaliatory weapons and make no attempt to defend our bases, population centers and war-making potential?

Without entering into any controversial discussion it appears obvious from a purely military point of view that without an active air



Specifically designed to engage very low altitude targets, the Hawk has also scored direct hit on target missile at altitude of six miles.

defense of the Nation, an enemy could knock out most of our retaliatory bases, a critical segment of our population and a vital portion of our industrial centers with but a relatively small expense in offensive weapons.

On the other hand, if an up-to-date active defense is maintained, a grave element of doubt is instilled in the minds of potential enemies as to the possible success of a nuclear attack. This is true deterrence.

Still further, in case of an actual attack our retaliatory powers and large population centers would undoubtedly suffer fewer losses than if there were no protection.

All of this is especially true since United States national policy and principles preclude striking the first blow—which means that an all-out war would probably begin with a massive attack against this Nation. So, difficult and costly as it may be, the returns from a creditable air defense are essential to the national defense.

To achieve such an air defense, two broad categories of weapons now are in operation or are being planned and developed. One is the area defense weapon of the Air Force, traditionally represented by manned interceptors although we now are entering an era in which so-called "pilotless interceptors" are competing for the task. This envisions aircraft meeting the incoming enemy as far out as possible to prevent approach to worthwhile targets. The main advantage attributed to area defense is flexibility.

The second is the local defense missile system employing Army weapons such as Nike-Ajax, Nike-Hercules and the Hawk to defend key points such as cities and retaliatory bases. A great advantage of the local defense installations now operative at many points is that each separate unit is autonomous, capable of acquiring, tracking and destroying a target independent of any other unit. Even further, the system has the ability to grow; it can be modernized by improving component parts rather than junking the entire system, as has been proved by conversion from Nike-Ajax to Nike-Hercules.

If providing a defense against high performance aircraft is difficult, it is certain that defending against missile attack will be much more so, for it will be impossible to match the height and speed of an incoming missile with ordinary interceptors or presently operational

air defense missiles. A system employing anti-missiles would be the only practical means of meeting such a threat.

At the same time, it is a military axiom that if a high level of defense is maintained against all threats but one, the enemy will concentrate on that one. This means that we must also maintain capability of defense against manned aircraft.

Despite the complexities of the entire situation, the Army believes that all foreseeable threats can be met within a reasonable air defense budget, provided that considered judgment is exercised in choice of air defense systems. We must have the courage to terminate obsolete programs which constitute a heavy drain on the limited defense budget without tangibly contributing to air defense.

In its quest for true modernization to provide the defenses needed in this field for the next decade, the Army believes:

- The problem of coping with the ballistic missile threat must receive the highest priority.
- Local defenses must be capable of engaging both aircraft and high performance aerodynamic missiles of small radar cross-section, traveling at any feasible altitude and speed, and in spite of massive electronic countermeasures.
- Subject to economic and technical feasibility, an area defense system is needed which will be capable of earliest possible engagement of incoming targets — a system that can inflict maximum destruction and disruption before the attackers penetrate the local defense system.
- Mobile air defense equipment must be available for protection of the field army.

For field army defense the Army depends now on mobile Nike-Hercules units to provide defense from high altitude attacks. The Hawk, now being put into production, is a mobile missile system capable of engaging high performance aircraft at medium and low altitudes. Also — a problem not present in continental United States defense — army troops must be protected from the possibility of low-level attacks by medium performance aircraft, large numbers of which are still in service. Required here is a highly mobile, short-range air defense weapon which would be either a rapid-fire small-caliber cannon or a rapid-fire missile system with highly accurate fire control.

Still necessary for field unit protection are individual air defense weapons with greater capability than existing .50 caliber machine guns. Defense must also be provided against ballistic missile attack.

In all air defense systems, complex electronic computers to aim and coordinate area missile batteries are necessary. They are the brains of a system, tying together all elements from target detection to destruction. The Missile Master, already installed in some locations, is the electronic brain for the coordination and control of Nike batteries in fixed defense to insure the most effective distribution of fires against a mass attack. Its field equivalent is termed Missile Monitor. Again as with so many other items needed to provide modernization, there is a lag in production.

Mobility

THE term "mobility" unfortunately has come to mean to many persons merely wheels, tracks, wings and other means of locomotion. Actually mobility is a quality—something that can be built into items or incorporated into organizations. It is not merely an entity in or by itself. It is tightly interlaced with many other prerequisites of a modern military force—and its attainment is a necessary goal of a modern army.

Mobility really is the *ability* to move or be moved from one location to another and to be logistically supported in terms of response to strategic or tactical requirements. Mobility is particularly important to our Army because of the great distances which must be covered to engage hostile forces, because of the great mechanized forces of the Communist bloc, because of the necessity to maintain forces capable of engaging effectively in both nuclear and non-nuclear warfare, and because of our concept of operations when nuclear weapons are used or may be used.

It is apparent, then, that mobility has two broad divisions—strategic and tactical.

Strategic mobility is the capability of moving forces to wherever they may be required in the world. It may be achieved by first assuring readiness of units to react. It involves both readiness of personnel and their equipment, and the weapons and other items that can be moved with sufficient rapidity to influence the action.

This concept has been incorporated into the new Pentomic division reorganization. It also influences research and development of new weapons and supporting equipment, including engineering, communications and transportation items. Emphasis is placed on miniaturization and lightness without sacrificing—or when possible even increasing—fighting ability.

It is in the area of strategic mobility that, as General Maxwell D. Taylor pointed out in his five point program to meet possible challenges imposed by limited war, expanded joint planning and training is a major requirement. The Army must depend on the Air Force for sufficient air lift to carry its STRAC units to meet aggression; and also on the Navy to provide sufficient tonnage to support oversea deployment of forces.

At the same time, the Army has increased its own sea-lift efficiency through development of the roll-on roll-off ship that can load and discharge mobile equipment in hours instead of days, and of the rough terain forklift truck that can swiftly unload huge tonnages. Further, the Army has developed over-the-beach concepts and equipment to provide greater strategic mobility.

Tactical mobility is the capability of movement in the presence of enemy forces or in the execution of any tactical mission. Execution of the tactical doctrine for future warfare requires a very high degree of mobility in all its aspects. Mobile concepts do not in themselves require that new tactics be developed, but they obviously contribute to formation of doctrine, and they do require greater initiative and

Off-road transportation, as embodied in this concept of a nuclear-powered train, is the object of intensive research and development.

imagination in their formulation and execution.

Mobility in this area requires units thoroughly trained for the type of warfare envisioned for the future — units having powerful weapons and lightweight equipment that demand minimum logistical support. It requires also the attainment of unrestricted cross-country movement through proper combination of movement by foot, by ground vehicles or aircraft. It further requires proper communications facilities.

Surface transport. Current Army efforts to increase mobility of units are focussed on development of compact, lightweight, airtransportable vehicles capable of traveling over any land surface or small bodies of water. Besides traveling long distances on low-cost fuel, the desired vehicles would protect against small arms fire, shell fragments and nuclear effects. Future planning calls further for vehicles that could also take to the air to overcome terrain obstacles, and that could even hover with maximum loads, perhaps by overcoming effects of gravity. While some of these goals may be visionary, they indicate the desired direction of research and development efforts to make the greatest possible contribution to improved ground mobility.

Considerable strides have been made in producing ground vehicles that are lighter, more economical, easier to maintain and refuel, than existing items. Substitution of light metals for steel is one phase of the progress to date.

Some examples here include the Army Mule, already in production; the M-113 armored personnel carrier utilizing armor plate, which is air-droppable; a new intermediate duty truck, the XM410, also using aluminum for its integral-body frame, which can float when fully loaded.

The XM410 is part of the development plans calling for an entirely new "family" of trucks that will fill requirements for greater mobility. They would be designed to use gasoline, kerosene or diesel fuel and would provide greater payload capabilities and fuel economy.

Fuel quite obviously is of the utmost importance in mobility. Advances have been made in transportation, storage and distribution of bulk fuels. Advances also have been made by perfecting a family of

collapsible containers that can transport POL by air as well as surface vehicles. Some of these are air-droppable. Conversion kits can make vehicles and rail cars—even aircraft—into bulk carriers. Plans also have been worked out to install pipe lines to carry POL from shore inland to storage areas. A Rolling Fluid Transporter which pulls giant treaded rubber wheels in tandem is another—the wheels carry the fuel.

Off-road transportation is the object of intensive research and development. Some items have reached the test stage, others are in development, and some are still in the concept stage. One off-road train is already in operation—an all-wheel-powered Logistical Cargo Carrier that has been tested in the Greenland Icecap. Another item under development is a truck equipped to operate off the road, pulling six tires containing 3,000 gallons of fluid.

The GOER is a vehicle concept for improving cross-country logistical mobility through adaptation of the principles of large earth-moving vehicles. The current development vehicles can carry a 15-ton payload across rough terrain. Feasibility of larger and smaller versions is being studied.

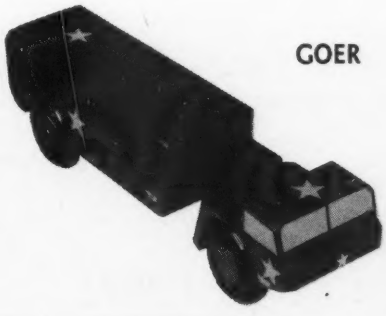
Already mentioned as contributing to greater mobility are the self-propelled carriage for the 105mm howitzer, and another capable of mounting the 8-inch howitzer or the 155mm gun.

In addition to lighter weapons and transportation items, mobility is being sought in engineering items. New, lighter ground moving equipment, automatic ditch and fox-hole diggers, bulldozers light enough to be air transportable but still capable of performing heavy duty, new bridges and bridging methods are under way. A mobile assault ferry is under development. Again, however, there is a lag between capabilities and actual production.

Air transportability has been stressed as a leading characteristic of tactical doctrine, and of most combat items now under development. Both speed and freedom from terrain restrictions have great value in tactical operations.

While adoption of the helicopter has given a revolutionary assist to mobility, continued research is being pushed to provide air vehicles for specific tactical purposes. These, it is envisioned, would have capability for either ground or air operation in all weather, be able to operate from unimproved terrain, carry up to 10 tons of payload, have low fuel consumption and increased range combined with ease of maintenance.

At present stress is being placed on Short-Take-Off-and-Landing (STOL) or Vertical-Take-Off-and-Landing (VTOL) capabilities for fixed-wing aircraft. Several types have been developed by commercial firms and are in the flight test



GOER

stage. Advantages of VTOL aircraft are obvious—ability to pick up and deliver men or cargo without regard to landing strips, to hover, to take advantage of terrain cover.

Actually the helicopter is a VTOL craft, but its speed and weight limitations make research into VTOL fixed wing types mandatory. Some of the new aircraft currently being developed for the Army include:

"Iroquois" — a turbine-powered utility helicopter capable of transporting small tactical weapons and equipment.

"Mojave" — a medium transport helicopter.

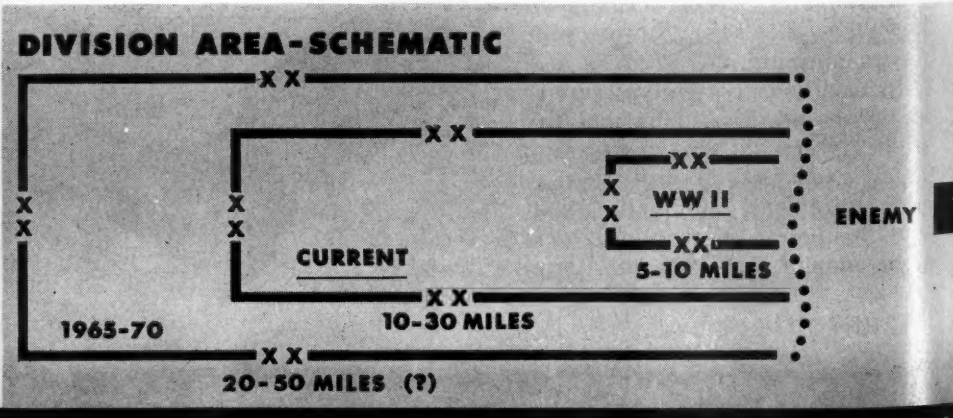
"Mohawk"—a fixed-wing aircraft that flies low and fast carrying necessary surveillance equipment for swift ground observation.

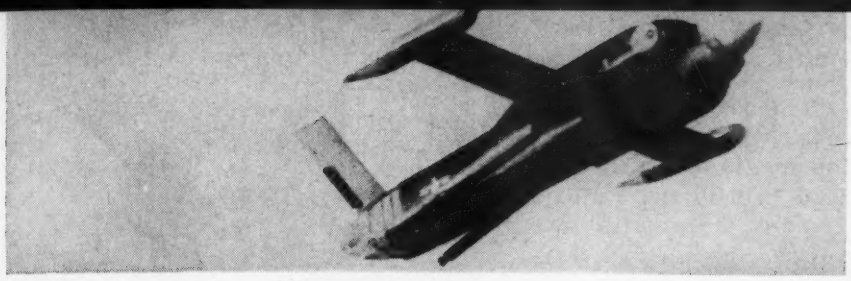
"Caribou"—currently being tested—is the Army's newest and largest transport capable of carrying 31 passengers or 22 litters or 3 tons of cargo. It needs only 800 feet of runway. Its predecessors, the "Otter" and "Beaver," have been used successfully and now are flown in 58 countries.

Concepts, some of which have advanced to the research and development stage, include the "flying crane" to carry large loads; powerful jet-driven helicopters that could be armed with machineguns and rockets; adaptation of the helicopter principle to an individual flying platform type of aircraft; and a vehicle that uses the ducted fan principle for flight.

Given sufficient funding, most of the aircraft under development could be put into production with little delay, while the concepts could be pushed along more swiftly toward actuality.

"Both speed and freedom from terrain restrictions have great value in tactical operations." *Above*, lightweight aluminum personnel carrier prototype undergoes test. *Below*, a Nike-Hercules missile is loaded aboard plane.





Communications-Electronics

WITHOUT necessary communications facilities, all the new weapons, trucks, tanks, aircraft would be of little use to a commander fighting on the modern battlefield. Lacking the means of control, dispersed units could not act in concert, could not converge, lay down firepower, penetrate enemy territory, disperse.

Communications, therefore, provides the nervous system that allows the various parts of the Army "body" to function as an efficient entity. Concepts and equipment of the World War II and Korean War era are no longer satisfactory; for today and for the future, the Army needs communications-electronics equipment that is compact, lightweight, rugged, easily maintained and installed.

Equipment for a modern communications-electronics system may be divided into four major subdivisions — communications, combat intelligence support, electronic warfare, avionics.

The first subdivision is further divided into requirements for combat units below division level and those for divisional commands and higher. Now undergoing test by the CONARC Boards is a new family of radios required for battle group, company and platoon level in the infantry, at all levels of artillery and in all armored vehicles.

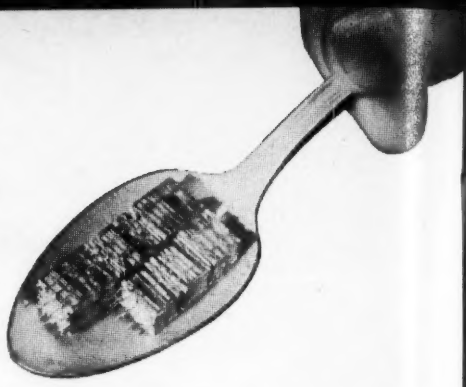
The new family includes two man-pack sets, a vehicular set and an aircraft set. This represents a substantial reduction in types now required. All are transistorized and constructed on the new modular basis, providing great reduction in size, weight and maintenance.

The great strides made in miniaturization research will affect not only size and weight of equipment, but will reduce the logistical problems involved and will slash maintenance time and training. All this gives promise of providing the necessary increased versatility and greater range capabilities that must be attained if the Army's concepts of future operations are to be achieved.

At battle group level and below, prime examples of new developments are a radio switching central, AN/MRC-66, and a radio relay switching central. The AN/MRC-66 is the radio version of the local wire switchboard which is used at battle group and lower unit level, while the switching central is the radio version of long distance switchboards normally employed at division area communications sub-centers. These sub-centers serve as points of interconnection by radio relay and field cable.

When used in conjunction, the two centrals will permit a battle group commander to call the

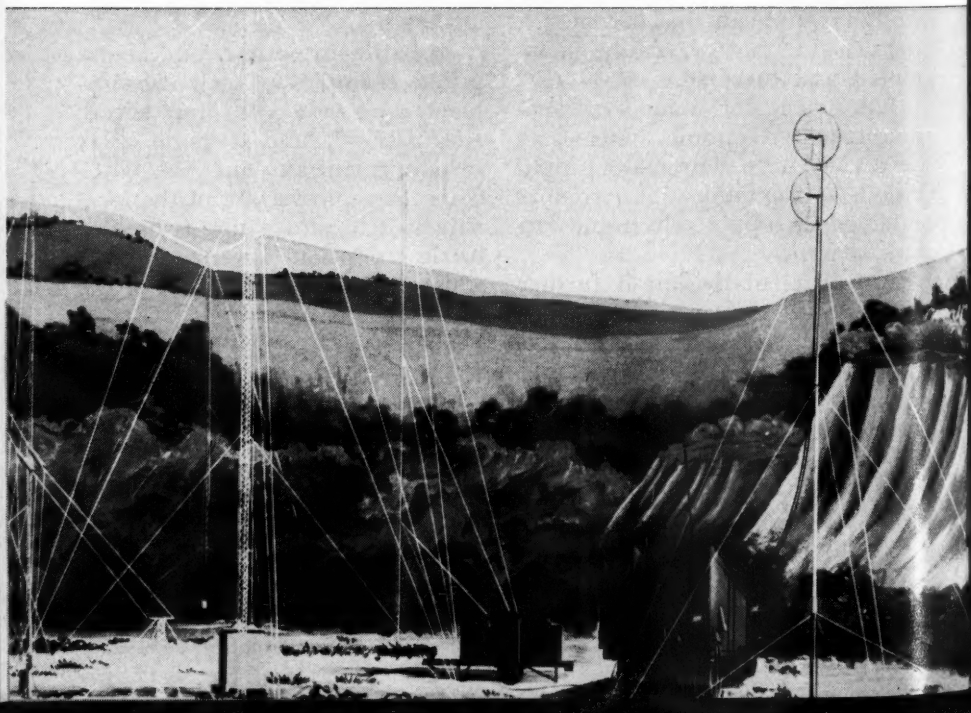
division commander, although both may be on the move. Research is underway to replace existing manual switchboards with fully automatic electronic switchboards. When this is made possible, the switching centrals as well as the individual users could all be on the move without any loss of service. Automatic electronic switchboards now are being tested by the Army.

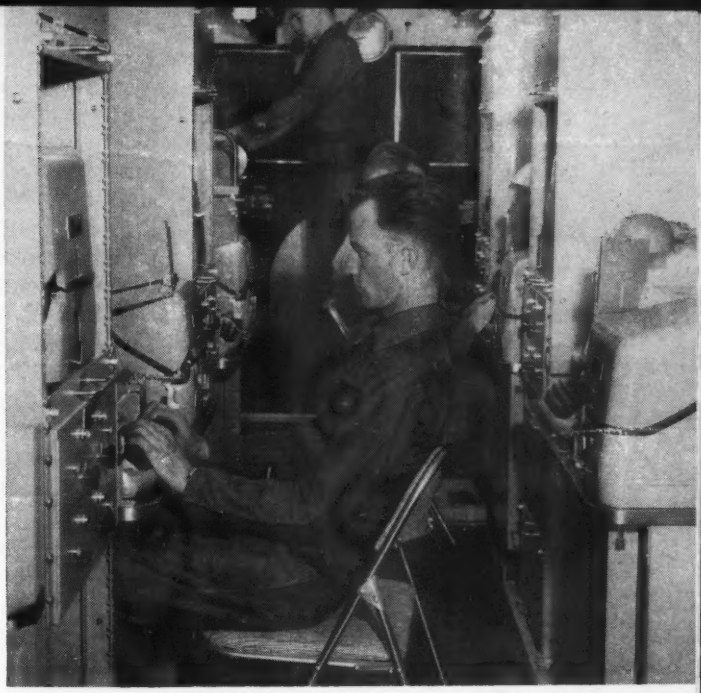


To provide for operational flexibility above the battle group level, a new communications concept—known as the area communications system—has been developed, replacing the single-axis type of communications. The ACS employs a number of facilities placed strategically through a combat area, normally near battle group command posts. Each sub-center is connected by multi-channel radio relay to several others, thus allowing a choice of routes over which a message may be sent. This would provide service to the battle group itself and throughout the rest of the area system. Each sub-center can be tailored to meet existing requirements on a building block basis.

To provide this desired flexibility, several families of equipment are under development. One con-

New air-ground transportable radio system provides combat commanders with communication capability previously possible only in large fixed installations. Complete system can be airlifted by three C-124s to any trouble spot.





Advances in communications have been made possible by miniaturization and adaptation of equipment for air transportability. *Left*, micromodule radio receiver fits into a teaspoon with room to spare. *Right*, van-housed AN/TSC-16 radio communications system is air-transportable to meet quick reaction demands in war.

sists of radio relay sets to provide both the numbers of channels desired and frequencies employed. Also under development is a family of multiplexers to provide from 4 to 96 channels of radio relay or telephone communications, to terminate in an automatic electronic switchboard. This is scheduled for service testing this year.

Future planning calls for much routine communications now handled by telephone and teletype to be carried by automatic data processing systems. Also, a mobile computer specifically designed for field use is being developed and soon will be undergoing tests.

Combat Intelligence Support includes complete, reliable, continuous and accurate intelligence of the enemy, weather, terrain and friendly troop situations. To meet such requirements under conditions of increased mobility, dispersion and firepower, new and improved equipment is essential.

In two areas, combat surveillance and target acquisition, equipment is being developed to increase the Army's capabilities. This equipment may be referred to as sensory in nature, and falls into the fields of photography, radar, infrared, television, acoustics and electronic intercept.

Advances in photography include long-distance cameras, better equipment for use in drone aircraft—some capable of taking hundreds of pictures a minute—and means for swifter development and printing.

In radar, a lightweight man-portable set has already been standardized as the Silent Sentry, capable of detecting moving vehicles and personnel under all conditions of visibility and weather. Other ground-based radar sets for use at levels above company are now undergoing test.

Infrared items include newer, improved means of night vision for riflemen, instruments that can detect objects through heat radiation, and others.

Use of television for closed-circuit instructional use at various Army schools today points the way to battlefield use by connecting television with operations centers.

All of these devices complement one another and permit continual collection of information. Their introduction into the combat intelligence system is essential to success in battle. Some of them will be used in another developmental item of equipment—the drone aircraft. Now under test are reconnaissance drones using photographic equipment, radar and infrared. Use of drones as platforms for sensors has many applications. Some are expected to be available by 1961.

Electronic Warfare has two major functions—to produce and operate the equipment necessary to intercept and analyze enemy electromagnetic radiations and to disrupt their effectiveness; and to analyze existing and proposed systems to reduce vulnerability to enemy countermeasures.

In addition to intercepting enemy radiations for intelligence purposes, it may be desirable to jam them — a difficult operation since the nature of enemy equipment often is not fully known, and when known can be easily changed. The solution is to have a quick reaction capability—which the Army has—keeping on hand newly developed components that can be quickly assembled to meet any new enemy move.

On the other hand, it is vitally important to reduce vulnerability of our own systems to enemy jamming. This is an unceasing task since new electronic countermeasures are constantly being evolved. The requirement then is to ensure that electronic equipment in use by the Army is continually improved to counter new jamming threats.

Avionics has the function of providing electronic devices necessary to assure flexibility of operations of Army aircraft. If aviation is to be utilized to the maximum, the Army must overcome present restrictions imposed by terrain and weather. Ideally, Army aircraft would be able to operate at low altitudes under any weather condition, from unprepared airstrips, with minimal support.

To meet such requirements, the Army has under development a self-contained inertial navigator and a terrain clearance indicator, the combination of which should allow the desired operations. These items are not expected to be available for test before 1962, however.

Improved aircraft radio sets, the AN/ARC-54, can communicate with other sets in the radio net system, thus allowing immediate response from combat commanders from platoon level up. Also, in conjunction with identification equipment, the set provides positive identification to air defense units operating in the forward areas.

From all of this it becomes evident that progress is being made toward modernization of capabilities in the communications-electronics area. However as with other modernization aspects, there is a lag which could be overcome if sufficient funds were made available.

Logistics

AT THE very heart of modernization of the U. S. Army is the art and science of logistics—an art and science that itself has only recently been developed to its fullest, yet is but little understood or appreciated because it lacks the dramatic impact of new weaponry.

Viewed in terms of its major tasks, modern army logistics is the never-ending process of providing the equipment, supplies and services and assuring the continuity of this support to enable troops to fight under any conditions or in any type of warfare. Modern army logistics also includes the continuous replacement of the old with the new and improved. It has three key functions—Modernization, Mobility and Management.

Modernization is the process of providing the best available material, determining the kinds of items needed to carry out missions, and then equipping troops with the new and improved items after they have been accepted for production.

In this process of developing and improving new items, simplified maintenance and improved performance must be obtained. This involves increasing reliability of individual components and overall systems to reduce maintenance.

Simplification of maintenance involves improving accessibility of components, and reducing the time and skill level required to isolate faults and repair them. Time and technical skills can be saved by designing equipment that permits replacement or "throw-away" rather than long and costly repair of faulty subcomponents or modules.

Associated with the function of determining how much is needed where, and of procuring and distributing the needed items, is the orderly replacement and ultimate disposition of old items. All must be accomplished with minimum disruption of current operations, with maximum economy of funds, and always maintaining optimum combat effectiveness. Careful planning and resourceful execution are obviously necessary.

Throughout this sequence, the ever-present questions arise — how much money do we need, and how can we use what we get to best advantage? Here are the crucial points where vision comes face to face with reality. This is where an astute evaluation of the logistic mission in light of Army objectives is absolutely necessary.

Mobility is a more illusive element of modern logistics than modernization, for it cannot be measured in terms of tangibles alone. It involves the responsiveness of support to the combat situation, including the logistic capability to support tactical actions on the atomic battlefield. It is not so much the ability to move from one place to another but, having moved, to be able to fight without requiring an uninterrupted flow of heavy tonnages. So, basically, the true measure of logistical mobility is the length of time a unit can move and fight without resupply.

To accomplish this effectively, supply austerity is a necessity. To many, "keeping pace with vision" is to have everything in sight; this

may be vision but it is not foresight. Getting along with bare essentials is not a popular idea, but the concept of mobility founded on austerity is gaining acceptance as a requisite of a modern army.

A new concept of organization and operations for the communications zone in a theater of operations has recently been approved for implementation and incorporation in Army doctrine. It is designed to offset increased vulnerability of lines of communications. Area commands have been added for rear area security and damage control, to insure flow of supplies even in a war with a discontinuous front.

The small general depot concept in forward areas to support corps has been adopted to insure dispersal of essential supplies. Such depots contain a cross-section of selected technical service items necessary for survival on the atomic battlefield. These already have been set up in Europe. Where the situation permits they operate underground for greater protection, while still retaining mobility capability.

Capability of supporting rapid deployments to critical areas—*i.e.*, strategic mobility as compared to tactical mobility—is an important aspect of logistic mobility. With rapidity of response being the measure of success, current concepts of modern army logistics to meet this challenge include:

Forward Base, a strategic reserve, consists of supplies pre-positioned in areas where the Strategic Army Corps might be deployed. It comprises heavy items required for immediate combat but which are too large or too heavy to move by air with the units. It also is limited to items requiring little or no in-storage maintenance or storage facilities such as ammunition, armor, trucks, engineer equipment.

Ballastable All-Purpose Tractor, currently under development, can be air-transported and air-dropped, with dirt added to give weight for bulldozing and prime moving jobs.

Sea and Airlift. Recognizing that airlift of an entire force is not logistically feasible, the Army is seeking to increase speed and efficiency of sealift. Already mentioned is the roll-on-roll-off vessel, one of which, the *Comet,* has already been put into use. Twenty-five vessels are envisioned by 1962.

In order to prepare more realistic limited war plans, the Army is currently stressing three key requirements in this area—predesignation of airlift and sealift capabilities; periodic joint mobility exercises; development of air and sea movement plans in support of approved contingency plans.

NODEX and CONEX. Since the means for achieving mobility can

become a highly remunerative atomic target, a large concentration of shipping at any location cannot be permitted to form. Operation NODEX has been evolved to move cargo across beaches and then inland to avoid accumulation of cargo that may offer a worthwhile target. Palletization of small items is being perfected to assist in unloading operations. CONEX shipping containers — large steel boxes — are utilized to make easily handled loads. Roll-on-roll-off ships play an important part in reducing "turnabout" time.

In addition to all these measures, many developments are underway to reduce supply tonnages, increase supply responsiveness or reduce logistical site vulnerability. These include dehydration and sterilization of food, lightweight mobile pipe lines, off-road nuclear powered trains, missile delivery of supplies, overland conveyors, and rolling fluid transporters, some already described in detail.

Management tools and techniques are important in controlling the Army's logistical resources — and they in turn also exert a profound influence on logistics. Reduction of the Army supply system through effective management techniques is being achieved by two principal measures.

First of these is use of electrical communications and automatic data processing equipment. Computation of requirements, stock accounting, inventory control and requisitioning have been speeded up, accuracy has been increased, to make the supply system more responsive to the combat commander's needs.

Second is elimination of seldom-used items and greater standardization of equipment and components. Despite introduction of new and more complex equipment, since 1952 supply items have been reduced from some million and a half to about 961,000.

Logistics, then, is the material means for achieving a modern army, embodying all of the realities which must be faced to attain the desired goal. The logistician can point the way for the Army to close the gap between what our vision indicates is necessary and what our science and technology can provide, if permitted to do so.

Chinook turbine-powered helicopter with rear loading ramp represents latest Army Aviation advance, looking toward eventual replacement of obsolescent piston-engine powered transport helicopters.

The Future

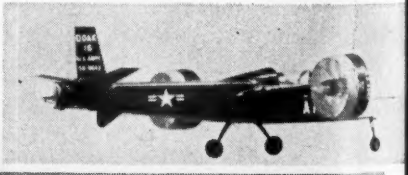
A STUDY of the U. S. Army today leads to certain clear-cut conclusions and points the way toward a course of action designed to assure attainment of the goal of a truly modern Army:

- Doctrine and concepts for fighting a modern war must be continually evaluated and tested for validity, and doctrine must be constantly revised to keep pace with concepts.
- Selection and training of manpower must fit in with doctrine and the available weapons and equipment.
- The Army must work closely with its sister services in developing doctrine, equipment, weapons and training plans.
- A lag exists between concepts and production—a lag that cannot be obviated by planning and programming alone. Unless modern weapons and equipment are supplied, the U. S. Army will labor under a heavy handicap in becoming a decisive force for implementing national policy.
- That lag could be overcome by providing necessary additional funding.

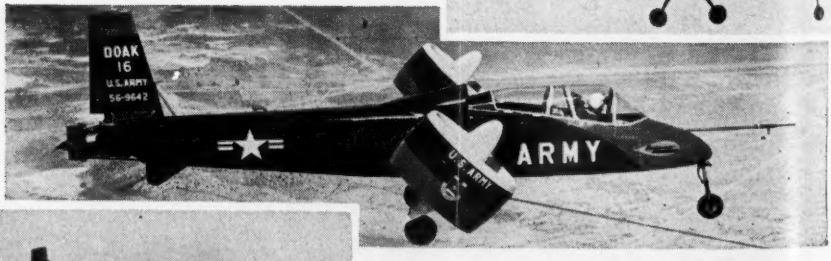
WHAT, then, would this "necessary funding" cost?

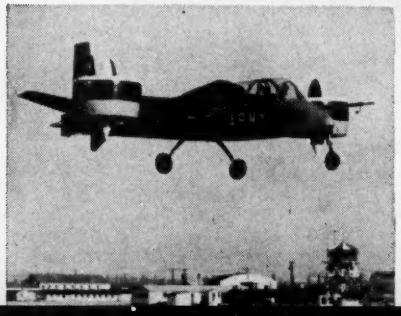
General Maxwell D. Taylor, when Army Chief of Staff, outlined to the Congress a five year program calling for expenditure of some $15 billions for modernization of the Army. He pointed out that for an additional $3 billion per year over existing Army budgets, the Army could maintain itself and progress toward the goal of becoming truly modern.

This would raise Army direct obligational authority from about $10 billions to $13 billions—only



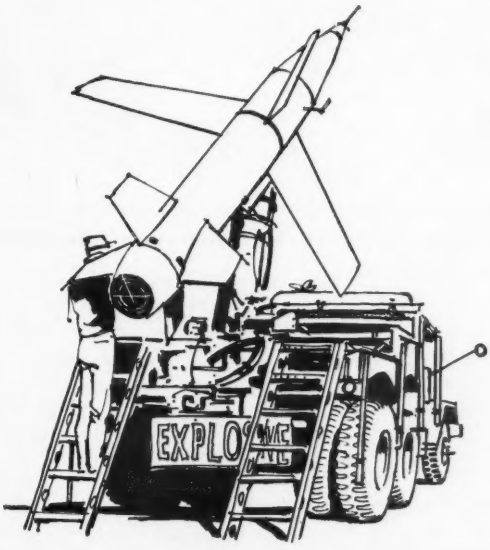
Mid-air transition from vertical to horizontal flight is demonstrated by Army VTOL aircraft —the Doak 16.





Ducted fans on wing tips lift plane vertically like helicopter, then swivel to move plane into forward flight. Aircraft also maneuvers easily on ground under its own power.

slightly ahead of Navy's $12 billions and far behind the Air Force's $19 billions. When it is considered that this Nation's annual gross product stands just under the $500 billion mark, the price for modernizing the Army would be only some *six tenths of one percent of the gross national product.* Such a fraction could scarcely be considered an overly large price to assure that the Army would be properly prepared to carry out its mission in case of war, while maintaining its ready strength as a deterrent to aggression and as a safeguard of our way of life in a troubled world.



MODERN ARMY THEME OF AUSA ANNUAL MEETING

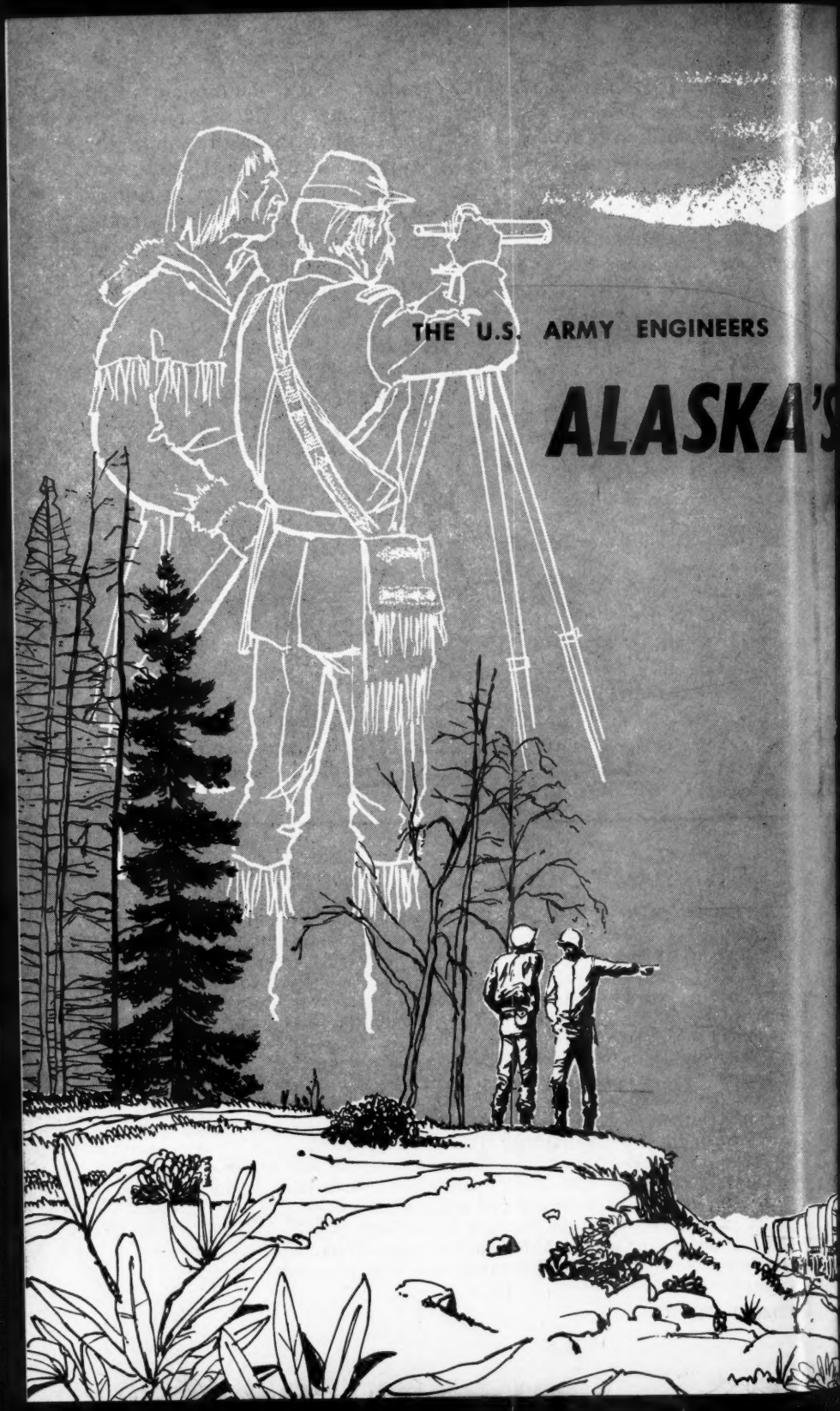
THE Association of the U. S. Army will further develop the theme "What Is A Modern Army?" in programs and panel discussions during its annual meeting on 3, 4 and 5 August at Sheraton-Park Hotel, Washington, D. C.

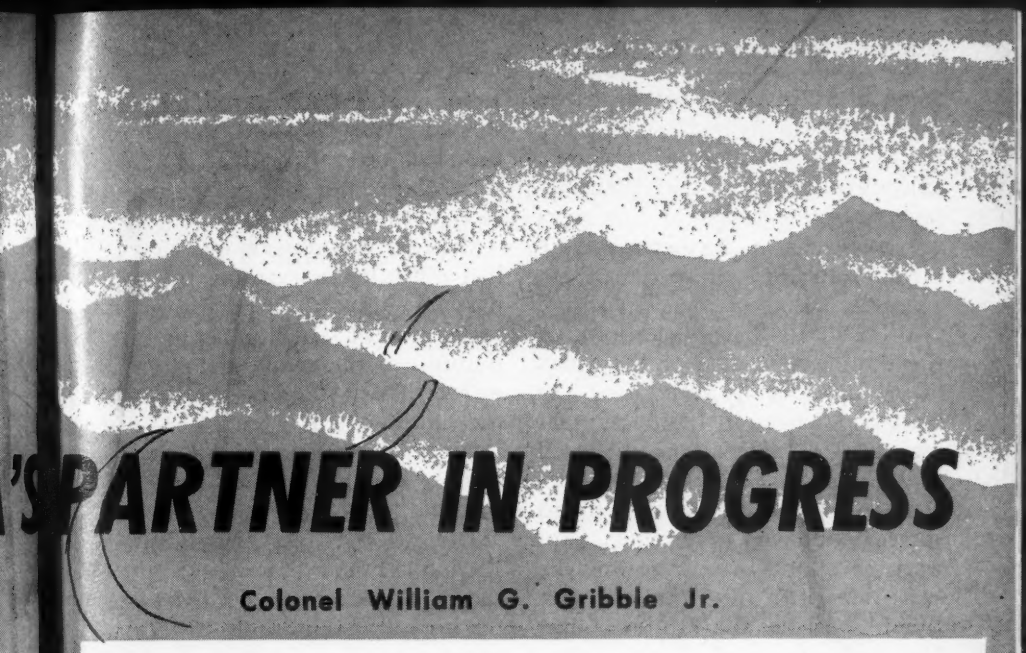
Besides furnishing a national forum to focus attention on accomplishments and requirements of the United States Army, the annual meeting provides a means for members, Government executives, industrialists, educators, press and public to learn of the vital role of the Army in national defense.

Addresses will be given by Secretary of the Army Wilber M. Brucker, Army Chief of Staff, General Lyman L. Lemnitzer, and other outstanding civilian and military leaders. Presentations will include discussions and talks on the need, evolution, manning of a modern army, ground power and diplomacy, research, and how a modern army is used and supported.

Industrial exhibits will feature the latest industrial and scientific developments in the military field. Army exhibits will include latest equipment and materiel, including experimental and prototype models.

A reception honoring the Secretary of the Army and Chief of Staff will be held 3 August; the annual AUSA luncheon open to guests will be conducted on 4 August; and the annual banquet, open only to members, on 5 August.


THE U.S. ARMY ENGINEERS
ALASKA'S



'S PARTNER IN PROGRESS

Colonel William G. Gribble Jr.

ON A wooded bluff above the muddy, many-channeled Yukon River, a stone's throw away from Old Fort Yukon which was built here above the Arctic Circle by the Hudson's Bay Company, stands a large frame building which served as a fur trading center even before Alaska was purchased by the United States. Nearby are two large plastic-covered bubbles containing the radar ears of an Aircraft Control and Warning station that ties in with the Distant Early Warning (DEW) Line guarding northern continental approaches against surprise aerial attack.

COLONEL WILLIAM G. GRIBBLE, JR., Corps of Engineers, is on duty with the U.S. Army Engineer District, Anchorage, Alaska.

This juxtaposition of the ancient and the new typifies dramatically the role played by the U. S. Army Corps of Engineers in the development of the new State of Alaska. For it was at Fort Yukon, shortly after the United States acquired the Territory in 1867, that the Army Corps of Engineers first started their work in the Northland. It was the same Corps that built the Air Force station many years later.

Between the old days of the wooden fort manned by Hudson's Bay Company traders and the latest installation manned by nuclear-age technicians, the Engineers played an important role in the development of the entire area.

Some of it involved actual battle during World War II. The story is still not ended, for today officers, enlisted members and civilian employees of the Corps of Engineers are assisting in further development of the new State.

WHEN U. S. soldiers lowered the double-eagle flag of the Czars of all the Russias and raised the Stars and Stripes in 1867, the great majority of Americans believed that Alaska was a barren wasteland covered by perpetual ice and snow. Boundaries were vague, maps were scarce and inaccurate, and the first American fur traders were turned back at the Hudson's Bay Company post of Fort Yukon where the factors claimed they were still on British territory. In an attempt to clear up this situation, the Army was authorized in 1869 to send an officer to map the upper Yukon River.

In an expedition which should rank with the Lewis and Clark expedition in the public mind—but which today is virtually unheralded—Captain Charles Walker Raymond and a civilian assistant, John J. Major, chartered the tiny steamer *"Yukon"* and started up the river on 4 July 1869. Twenty-three days later the party arrived at Fort Yukon.

Captain Raymond noted that he had difficulty in carrying out that part of his orders regarding investigation of "the number and disposition of the native tribes on or in its vicinity" because the sight of the smoke-belching monster—first steamer ever seen on the river—usually sent any natives scattering into the woods..

Despite the fact that Captain Raymond's surveys might show that the fort was in United States territory, the Hudson's Bay Company agent received the party cordially. As a matter of fact, Captain Raymond soon established the correct longitude and latitude of the post and as a result had to order the Company to vacate the buildings "as soon as practicable."

Meanwhile the little *"Yukon"* had to start the return voyage lest it be caught by the ice of early winter, and Raymond and his assistant had to return overland. On starvation rations, they narrowly

Slashing through woods was just one obstacle Army Engineers overcame as they pushed the Alcan Highway over the 1,600 wilderness miles in 1942.

escaped with their lives on several occasions in their adventurous journey down the river.

Captain Raymond finally retired in 1904 with the rank of brigadier general after a distinguished career with the Corps of Engineers. In addition to blazing the trail for the Yukon fur trade, he had made the first complete map of the river, and his report gave the first reliable information on the area's topography, resources and native population.

IN THE years that followed, the Corps of Engineers and the Army Signal Corps (See "Lifeline to the North," November 1954 DIGEST) helped map the wilderness, build roads, establish communications, carry on research into Arctic military building, without which it is safe to say that the entire area could not possibly have progressed to its present status.

For the Corps of Engineers it was a saga of hardships—of building the wilderness-smashing Alcan Highway, of a secret construction project disguised as a fish cannery which may have stopped a Japanese invasion of North America, of construction projects which contributed immeasurably to the economic life of the new State.

IMPETUS to exploration of the Alaskan wilderness came when gold was discovered in 1896 in Canada's Yukon Territory. With dramatic suddenness, the neglected Northland burst into the world spotlight. A wild stampede was on that spread from Canada into Alaska. Transportation, food, even life itself—all were at a premium.

The influx of miners and prospectors into the area where Fairbanks now stands soon pointed up the need for trails and roads. By 1905 the Alaska Road Commission was established as a Corps of Engineers' function. The first trails and wagon roads, later to grow into Alaska's highway network, were blazed through the wilderness. Before the Road Commission was set up as a separate agency, some 30 Engineer officers had served with it, including a young lieutenant, later Major General E. C. Itschner, Chief of Engineers.

While Engineer officers were laying out the first roads, others were forging another vital link in transportation lines. In 1913 the Alaska Railroad was authorized to connect the seaport of Seward with the interior city of Fairbanks. Corps of Engineers officers helped survey the route, and personnel and equipment were moved up from the Panama Canal project to speed construction.

Even earlier, in 1902, the first civil works project in Alaska was undertaken by the Corps of Engineers with a survey of Wrangel Narrows. The program of improving waterways, flood control projects and construction of harbors has continued ever since. Recently it has included comprehensive water resources studies which have revealed the enormous potential hydroelectric power resources of Alaska.

As important as these civil projects have been, and still are, in the economic development and advancement of Alaska, the military construction program has, through sheer size, overshadowed all. This has been especially true since the air age brought a new realization of the strategic importance of the far

northern reaches of the continent.

At the same time, many of the military projects—as so often has been the case in the history of the U. S. Army—proved of direct benefit to the civilian economy. The Alcan Highway, for example, conceived and carried out for purely military reasons, provided Alaska with a long-sought direct link to the outside world.

TODAY the volume of military construction is staggering, and plays an extremely important part in the economy. From 1939 through 1946 such construction—excluding the Alcan Highway and Canol Pipeline projects—amounted to an estimated $1,080,000,000. Since 1946, postwar construction has amounted to another billion.

The start of the postwar program launched a boom for Alaska's two main cities of Anchorage and Fairbanks. Thousands of construction workers streaming into the Territory provided a prime economic stimulus. In fact, the Engineer construction program constitutes the largest "industry" in Alaska today.

Large-scale military construction began in Alaska in 1940 under the Quartermaster General when war appeared imminent, and continued under the Alaska Department Engineer. Early work included the beginnings of Ladd Field near Fairbanks, and Fort Richardson at Anchorage. At the same time, under jurisdiction of the Seattle District Engineer, airfield and garrison construction started at Yakutat and Annette in Southeastern Alaska. All projects were brought under the Corps of Engineers in January 1941.

UNDOUBTEDLY the greatest feat of military construction was the building of the Alaska Highway, commonly called the Alcan. For years Alaskans had sought an overland link, whether highway or railroad, with the United States. Studies had been made by United States and Canadian commissions, but it remained for war to give the impetus to such a costly and ambitious project.

A passenger train rumbling into the small Canadian prairie village of Dawson Creek, British Columbia, in the early morning hours of 9 March 1942 rang up the curtain on the construction epic. On it were the first troops of the Corps of Engineers, destined to write a new page in engineering history by building the 1,600-mile road. They started their first day's work in a biting blizzard that swirled the snow in minus 30° temperature.

The route selected was aimed primarily at linking up military bases in Canada along the air lane to Alaska—a decision that was criticized by many of the early supporters of a highway to Alaska. However, the Engineers' job was to build a road and they did, despite numerous obstacles never before encountered in road building.

Hundreds of streams had to be bridged—streams that were trickles most of the year but roaring, bridge-smashing torrents during the spring "break-up." The route had to be carved through dense forests, across bottomless swamps, and around jagged mountains, and it had to be put down on frozen ground where the terrain turned into a quaking bog if the topsoil were removed. Cold was a constant enemy during the long winter

Corduroy formed temporary bed for truck convoy during early construction days as Alcan Highway was being pushed through to hurried completion.

months, and during the short summer the blazing sun brought out clouds of giant mosquitoes.

Most of the men thrown into this engineering battle were fresh from civilian life, but they did their work well and by 20 November of the same year, 1942, a dedication ceremony was held at the fittingly named Soldiers' Summit in Yukon Territory. The first convey of Army trucks moved north over the Alaska Highway to the terminal at Fairbanks on that day.

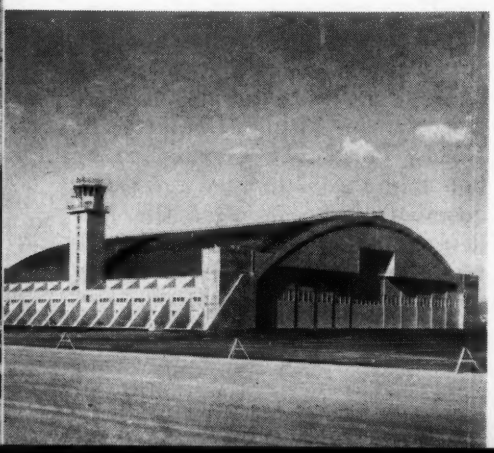
Not nearly as well known—in fact a chapter even now little publicized but which was destined to play an important part in turning the tide against the Japanese—was the secret construction of an airfield on Umnak Island to protect the Dutch Harbor naval base. In late 1941 the firm of Umnak, Saxton & Company was organized in Seattle with the announced purpose of constructing and operating a fish cannery in the Aleutians. Supplies and men were rushed to Umnak Island under guise of this company, and the field was completed just a few days before the Japanese air attack on Dutch Harbor, 3 June 1942. From the new field twelve P-40's of the 11th Fighter Squadron roared up to beat off the Japanese bombers and block a possible invasion of the North American continent.

During World War II the Engineers—as they had done in past wars—often were in the thick of the fighting, as well as serving as support troops performing important building work. In the Alaska area this was no exception. Engineer troops took an active part in the Battle of Attu. American troops landed on the Japanese-held island in the Aleutians in May 1943, and a violent struggle followed, with atrocious weather as much an enemy as the firmly entrenched, fanatical foe.

A tribute to the combat engineers is to be found in the sign erected on Attu: "ENGINEER HILL. This hill was so named in honor of the 50th Engineer Regt. (combat), who repulsed the last desperate counterattack launched by the Japanese. Here, early on the morning of 29 May 1943, the

Half of the "two-building city" that makes up Army Port of Whittier is the Buckner Building containing living quarters, administrative and recreational facilities.

A far cry from rough living quarters of World War II is Fort Richardson barracks, above. The Corps of Engineers built huge aircraft hanger, below, at Air Force base in Alaska.



bloodiest engagement of the battle was fought."

FOLLOWING World War II the strategic importance of Alaska, situated at the top of the world where air lanes shrink time-distances, was so apparent that no longer could the United States allow garrisons to consist of a handful of men, as had been the case just before the war. This added importance meant active Engineer participation.

On 10 April 1945, the Secretary of War signed the authorization creating the Alaska District, Corps of Engineers, and by 1 May the new District began active operation. Previously the Territory had been a branch of the Seattle District. General Dwight D. Eisenhower as Chief of Staff had made the first vigorous move to have Alaska authorized as a District.

With a cadre of 35 professional and technical personnel transferred to form the nucleus of the organization, the mission of the new District was defined as jurisdiction over all military construction and military real estate for which the Chief of Engineers was directly responsible. Col. James D. Lang assumed duties of District Engineer. Three years later, civil works responsibilities were added to the initial mission.

Since then both phases have continued to increase in importance, and although military expenditures far overshadow the civilian work, the latter continues as a factor of considerable importance to the economy of the region.

In the field of military construction, the new District was faced with need for building permanent

new bases for the Army and Air Force, and at the same time rehabilitating the hastily built wartime facilities. Problems were intensified by lack of skilled labor in many of the construction trades, and by lack of construction equipment and supplies. Success of the dual program, however, is evident today in the various modern establishments that have been built.

FIRST contract under the postwar military program—which launched the boom period outstripping even that of wartime—was for $60,000,000 with the Birch-Johnson-Lytle Company. The contract included troop and family housing units, extension of the runway at Ladd Field Satellite (now Eielson Air Force Base), construction of utilities, power plants, warehouses and fire stations.

By 1948 the postwar material and labor markets were becoming stabilized and numerous construction firms were attracted to the area. Orderly planning, design and permanent construction were possible. Today large and small contractors are invited to submit open competitive bids on projects ranging from a few thousand dollars up into the millions.

Under supervision of professional career engineers, military construction has been keeping pace with the swift development of new defense methods and weapons, and has been adapted to Alaska's own problems of weather, terrain, vast distances, and transportation. Constant studies and experiments have been carried on in the Research and Development Laboratories of the Corps of Engineers, both in the United States and in Alaska. From these have come ideas, designs, inventions, methods, models and completed construction that win international attention.

Among the major achievements of the Engineers' civil works program has been the famous "Alcango" pipeline stretching between the port of Haines and Fairbanks; the unique "two-building" city of multi-storied structures at the Port of Whittier; and the complete modern facilities of the Army's Arctic Test Center at Fort Greely.

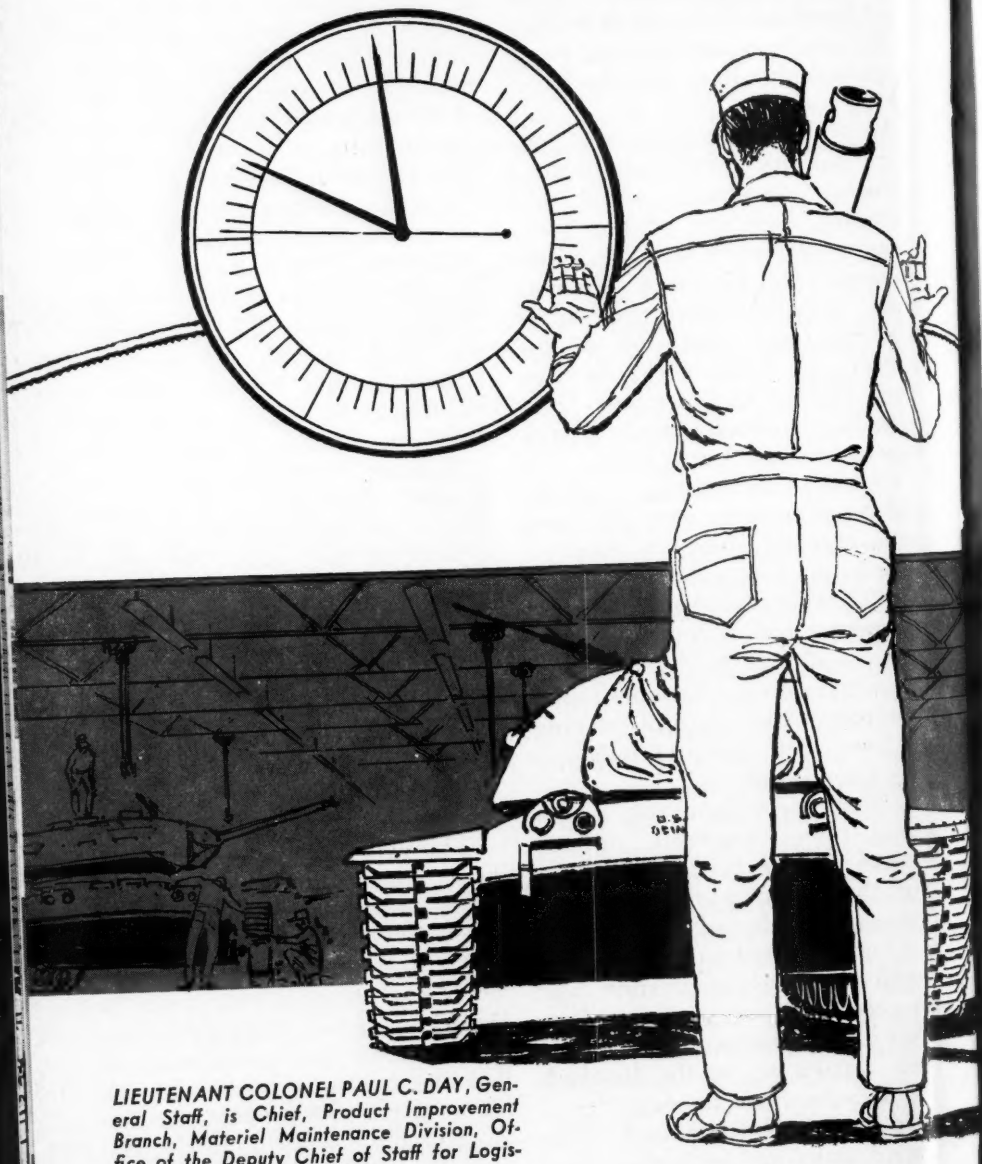
Greatest construction jobs of the current building season have included the DEW-line extension for the Air Force to the Aleutian Islands—a two-year, $25,000,000 project which extends the string of radar warning stations along a thousand-mile stretch of the fog-shrouded Aleutian Chain.

Another important project is nearing completion with construction of Alaska's first Nike sites to provide guided missile guardians to the vital areas surrounding Anchorage and Fairbanks. Work also is underway on another pioneering project which promises great advances in the future of the whole northern area—construction of the first nuclear heat and power plant at Fort Greely. (See "Rampart to the North," January 1959 DIGEST)

Through the years—from Alaska's purchase, through the exploration and development period, through World War II, and into the nuclear era—the Corps of Engineers has played a major role in Alaska's growth to strategic importance and national prominence. It is a role that undoubtedly will continue unabated with the accession of Alaska as a new star in the constellation of States.

Increased simplicity of operation and ease of maintenance without reducing performance—that is

THE CHALLENGE OF PR



LIEUTENANT COLONEL PAUL C. DAY, General Staff, is Chief, Product Improvement Branch, Materiel Maintenance Division, Office of the Deputy Chief of Staff for Logistics, Department of the Army.

F PRODUCT IMPROVEMENT

Lieutenant Colonel Paul C. Day

DURING the 20th Century, and particularly since World War II, advancing scientific progress has profoundly affected Army logistics. This progress, while making possible tremendous increases in firepower, mobility and shock action, has resulted in the development of increasingly more complex equipment. Largely as a consequence of this trend, the training of qualified technicians in sufficient numbers to operate and maintain its materiel has become one of the Army's major problems.

To resolve the problem of increasing complexity, Army materiel and logistics planners are emphasizing simplicity. At first glance, this may seem paradoxical, but further analysis reveals its intrinsic merit. As progress is made in the state of the art, equipment becomes complex and sophisticated. Effective utilization of this equipment lies in simplified operation, increased reliability under all conditions, ease of maintenance and a great reduction in the frequency of maintenance.

Reducing the degree of individual skill required to operate and maintain equipment makes possible substantial savings in training time and manpower. Significant reduction in logistical support tonnages also can be achieved.

In the past, as each new piece of equipment has been conceived and developed, the Army has been very explicit as to its military characteristics and specifications for improved operational performance. Unfortunately, neither the military nor industry has been precise in prescribing such essential features as simplicity of operation and ease of maintenance.

Late in 1956, Lt. Gen. Carter B. Magruder, then Deputy Chief of Staff for Logistics, launched a broad program of equipment simplification and improvement within his office and throughout the Technical Services. Objectives of this program are twofold — to reduce requirements for technical skills by increasing equipment reliability and simplifying its operations and maintenance; and to reduce logistical tonnages in our forward elements through technological improvements to reduce maintenance support hardware such as repair parts, tools, test equipment and similar items.

The program is being implemented by two approaches. The first, termed "product simplification," is concerned with new equipment while it is under development; the second consists of "product improvement" after equipment has been produced and issued.

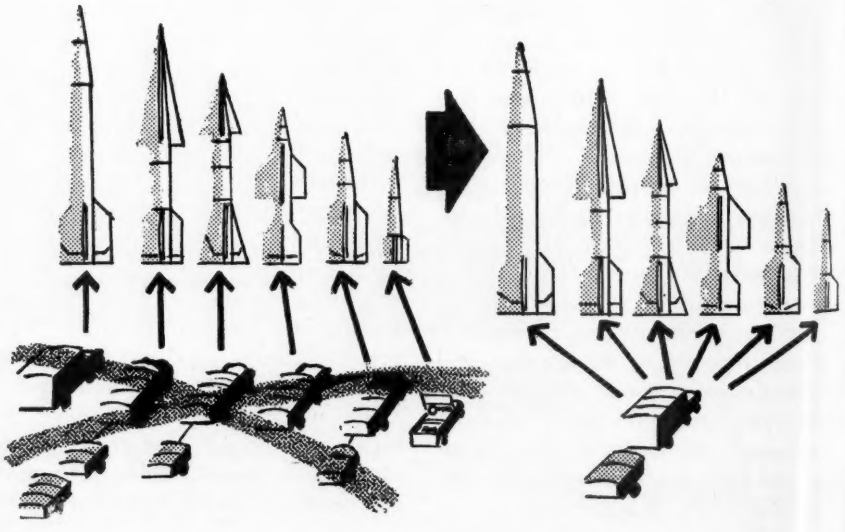
Army policy for product simplification requires that materiel under development be reviewed for ease of operation and maintenance at specific points in the development cycle—namely, on receipt of military characteristics from the preparing agency; during initial design, prototype design, engineering test, service test; and during other stages as determined necessary and mutually agreed upon by the developing and supporting agencies.

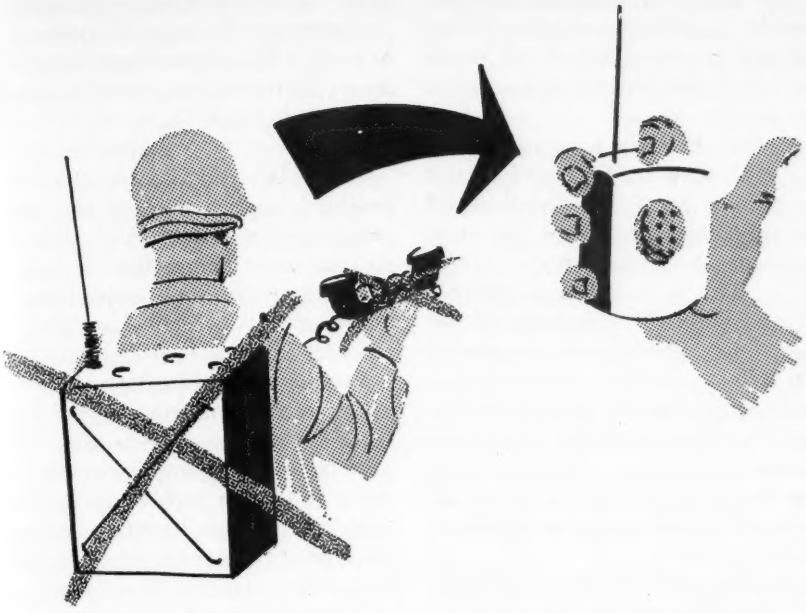
Product improvement modifications may be made to insure safety of personnel, to prevent damage to equipment, or to achieve significant reductions in maintenance.

TO carry out this program, small groups of logistically-minded engineers in the Office of the Deputy Chief of Staff for Logistics and in the Technical Services stress simplicity of operation and ease of maintenance in the initial design or later modification of Army equipment.

The initial influence of these engineers is brought to bear through review of Qualitative Materiel Requirements (QMRs) and Military Characteristics (MCs) for new items proposed for development. During the research and development phase, these engineers actively participate in the review of developmental items to assure that simplicity of operation and ease of maintenance are given maximum practicable consideration. They figuratively look over the shoulders of the design engineers as each new weapon or equipment item successively advances from concept, to breadboard, to prototype and finally to service test of the production model.

Experience has demonstrated that the best time to simplify is during the development of materiel—in other words, to inject maintenance thinking into design. But the task





of spelling out, in specific contractual language, exactly what is required to simplify the operation and maintenance of new materiel, is exceedingly difficult. While the Army has learned to write very finite and descriptive technical specifications to obtain optimum operational performance, only a start has been made in spelling out "maintainability" in measurable terms. One of the greatest shortcomings has been the lack of appropriate, specific limits expressed in meaningful and measurable terms in the preparation of design contracts. Progress is being made in this area, however. Logistically-minded engineers throughout the Army are now thinking in terms of the following objectives:

● *Improve reliability to reduce the need for maintenance.* Reliability refers to those characteristics which make equipment give satisfactory performance whenever and wherever it is used. The characteristic is "built into" the items to insure the desired performance for their entire intended life cycles. As reliability is introduced in equipment, we can expect to reduce maintenance. This leads to the next objective which is:

● *Reduce frequency in cyclic and corrective maintenance.* Improvements gained in reliability of materiel reduce the frequency of required maintenance. Besides the recognizable saving in manpower, there are additional gains in time saved by reducing the frequency of the maintenance cycle. This means more usable time for the component or end item concerned. Furthermore, reducing the extent of required maintenance tends to reduce the level of skills required by individual maintenance personnel.

● *Improve accessibility for adjustment and repair.* Even while studies in product simplification

go on, there is need to concentrate on improved design and construction to provide ease of access and simplification of adjustments and repair.

● *Reduce time for fault isolation and repair.* Test and repair procedures must be standardized and simplified to reduce the time required to locate and correct faults. This is an essential prerequisite to the full realization of the remaining three objectives, namely:

● *Use of standard parts, components, tools and test equipment.*

● *Interchangeability of parts, components and assemblies.*

● *Increased use of "throw-away" components and items to eliminate repair.*

When applied in proper proportion to equipment under development, all of these objectives make for simplicity of operation and ease of maintenance in the end product. They help reduce the number and levels of technical skill and manual dexterity of the support personnel as well as the amount and complexity of hardware required for maintenance support.

IN THE second approach—*i.e.*, product improvement — the same groups of logistical engineers are seeking ways and means of accomplishing the same objectives in equipment which has already reached the field.

Product simplification projects are currently underway in the guided missile, aircraft, electronic, transport vehicle, and fire control equipment fields. In each of the following projects, the Technical Service concerned has active contracts with competent industrial firms to achieve the stated aims:

Orient missile system design toward maintenance by plug-in modular assemblies, instead of by piece-part replacement. This will permit

MICRO-MODULES MEAN MINIATURIZATION

USING a completely new concept of micro-module circuits, radios no larger than sugar cubes have been developed and are expected to play an increasingly important role in miniaturization of electronic equipments. Sponsored by the Army Signal Corps with Radio Corporation of America as prime contractor, the micro-module program has achieved a better than ten to one reduction over existing refined equipment using printed wiring, transistors and other small parts.

THE vast range of jobs now done by transistors and other electronic parts is compressed into tiny micro-modules, which are cube-shaped circuit building blocks measuring only about a third of an inch. Using them, it is expected that critical weight and space savings will be possible in future satellite systems and rockets. Easier replacement, less storage space, reduction in transportation weight also are seen as advantages.

Although developed for defense requirements, micro-modules are expected to have many civilian uses in home and industry. Tiny batteries already have been developed for these and other small electrical items. A group of micro-elements—consisting of tiny flakes of conducting, semiconducting or insulating materials—are stacked up, interconnected and encased to form the micro-modules which operate as complete circuits, functioning as amplifiers, oscillators and the like.

easier accessibility, reduce fault isolation to easily replaceable assemblies and sub-assemblies, and improve reliability. At the same time it will reduce the number and level of technical skills required, particularly in the forward areas, and reduce the number of repair parts in the supply system. The newer missile systems under development are incorporating this principle in most of their electronic and mechanical assemblies.

Provide multi-purpose, automatic test equipment for missile systems. Test sets for missiles now in the field were designed specifically for the weapons with which they are associated. Development of a basic test set that will apply to several missile systems is well underway. It will employ automatic, tape-programmed techniques as well. This will markedly reduce the number of different types of test gear required. Speed and reliability of missile system check-out and fault isolation will be enhanced. The level and number of technical skills necessary to support the missile systems also will be significantly reduced.

Minimize the essential number of different types of turbine engines required for both fixed and rotary wing aircraft. The objective here is to have one turbine engine in each power range that is adaptable to both.

Reduce to the minimum the many different types of aircraft engine and flight accessories. The Army has been using as many as nine different aircraft generators, oil pumps, filters and instruments. The objective is to standardize on one of each wherever feasible.

Provide a versatile automatic test equipment for a wide variety of electronic equipment. Initial effort is to obtain a fast, reliable, tape programmed check-out and fault isolation test equipment to facilitate depot production line repair of the entire range of electronic equipment, such as teletype, radio, radar, electronic data processing systems, surveillance gear, and the like.

Develop solid state, transistorized devices to replace vacuum tubes and mechanical moving parts such as relays, vibrators, switches. The purpose is to reduce equipment size and weight and eliminate parts that wear out quickly.

Micro-miniaturize electronic equipment. This is being accomplished by mass production of tiny, wafer-size (1/32" thick by 3/10' square) resistors, capacitors, transistors, and by their assembly into circuits and complete equipment. This step will achieve a size and weight reduction of as much as 10 to 1 when compared to present items.

Provide multi-purpose radio sets. Using different environmental packaging, such sets will operate on the ground, in aircraft, in vehicles, within the same operating family, such as Very High Frequency (VHF) and Ultra High Frequency (UHF).

Develop "throw-away" components and, where economically feasible, "throw-away" equipment for fire control materiel. An example of this type of item is a non-jewelled, plastic cased wrist watch. Tests are being conducted on a waterproof watch with an accuracy of 45 seconds per day. The estimated replacement cost of this watch is so low that it will be much

cheaper to replace it than to service a standard model. Add to this the saving realized by relieving the inventory of the spare parts and special tools, plus the cost of providing the skills required to effect repairs. This same technique is being applied to field compasses, field binoculars, and certain types of weapons sighting scopes.

IN THE product improvement area, the following are typical efforts now underway to reduce logistical support problems for equipment already issued to the field.

Improve ground support equipment for missiles. Certain items of ground support equipment for current Army missiles are difficult to adjust and maintain. Contracts have been let to eliminate excessive and complicated adjustments and improve accessibility for maintenance. In one case alone, the number of daily adjustments required on a radar receiver will be reduced from 5 to 1 with a corresponding reduction in the skills required to perform them.

Increase time intervals between required overhaul of helicopter drive components. The available flying hours for helicopters have been very low because of the required frequency of overhaul of the dynamic components — engines, transmissions, drive shafts, rotor hubs and blades. These have varied from a low of 250 hours to a high of 2500 hours. Present objective is to achieve a minimum of 1200 hours for all helicopters by improved design and product simplification, by accelerated testing of existing dynamic components, and by controlled analysis and correction of component failures.

Improve helicopter control systems and provide flight stabilization gear. Present systems depend to a great degree on the pilot's continuous effort to maintain effective control. The installation of improved instrumentation and automatic stabilization will decrease pilot fatigue and expand aircraft utilization to include instrument flight and night flying conditions. All of these measures will provide greater safety and extend the utility of present equipment. Steps are also underway to provide automatic rotor RPM controls which will add improved flight characteristics to current helicopters.

Simplify performance check of Identification Friend or Foe (IFF) equipment. Until recently, reliable determination of proper operational performance of ground based IFF interrogator systems required use of complicated external test equipment by skilled technicians.

EASE OF MAINTENANCE OBJECTIVES

1. INCREASED RELIABILITY TO REDUCE MAINTENANCE.
2. REDUCED FREQUENCY IN CYCLIC AND CORRECTIVE MAINTENANCE.
3. IMPROVED ACCESSIBILITY FOR MAINTENANCE.
4. REDUCED TIME REQUIRED TO ACCOMPLISH MAINTENANCE.
5. USE OF STANDARD PARTS, COMPONENTS, TOOLS AND TEST EQUIPMENT.
6. INTERCHANGEABILITY OF PARTS, COMPONENTS AND ASSEMBLIES.
7. INCREASED USE OF "THROW-AWAY" COMPONENTS TO ELIMINATE REPAIR.

Modification of these IFF sets by the addition of a "Go, No-Go" checker to the front panel will soon enable the radar operator to determine at a glance whether his IFF is working properly.

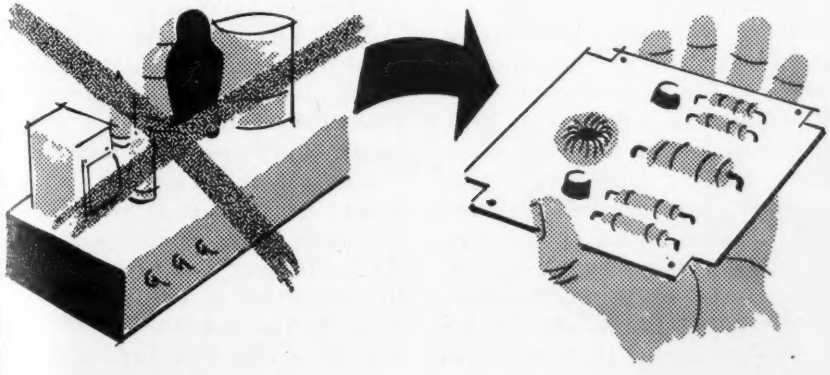
Increase time intervals between required overhaul of tank transmissions. Under contract with one of the Nation's leading automotive corporations, the Army currently is converting certain tank transmissions — a product improvement which *doubles* the time between required overhauls of this component. Converted transmissions will be stocked and installed as tanks are rebuilt. By doubling time between overhauls, the Army gains more usable time from the tank.

THESE projects are by no means a complete rundown of all the efforts now being made by the Technical Services in both the product simplification and improvement fields. Actually they are but a sampling of what is being done now and what will continue to be done in the future.

All efforts are pointed toward the goal of reducing requirements for high level technical skills and for logistical tonnages to support equipments in the field. As both the Army and civilian industry gain experience, more progress will be made.

CURRENTLY the most challenging aspect of the problem is the necessity for developing techniques for defining maintainability in specific, meaningful and measurable terms. When it is possible to clearly indicate in initial contracts the specific "maintainability" desired in terms at least as definite as the statement of desired operational performance, we shall be well on our way to achieving our objectives.

The long-range benefits are abundantly clear. For the Army at large and the soldier in the field, it means increased simplicity of operation and ease of maintenance—all this without reducing the performance of the weapons and materiel which are his tools for survival and victory on the battlefield.



Serving a developing nation's needs in war and peace—

THE ARMY OF B

Major Paul F. Wachholz

THE Brazilian Army enjoys a special respect and affection in the hearts of its countrymen. Symbolic of the Army's role, in war and peace, are two Brazilian national heroes—the "Duke of Caxias," Luis Alves e Lima; and the "Protector of the Indians," Mariano Rondon.

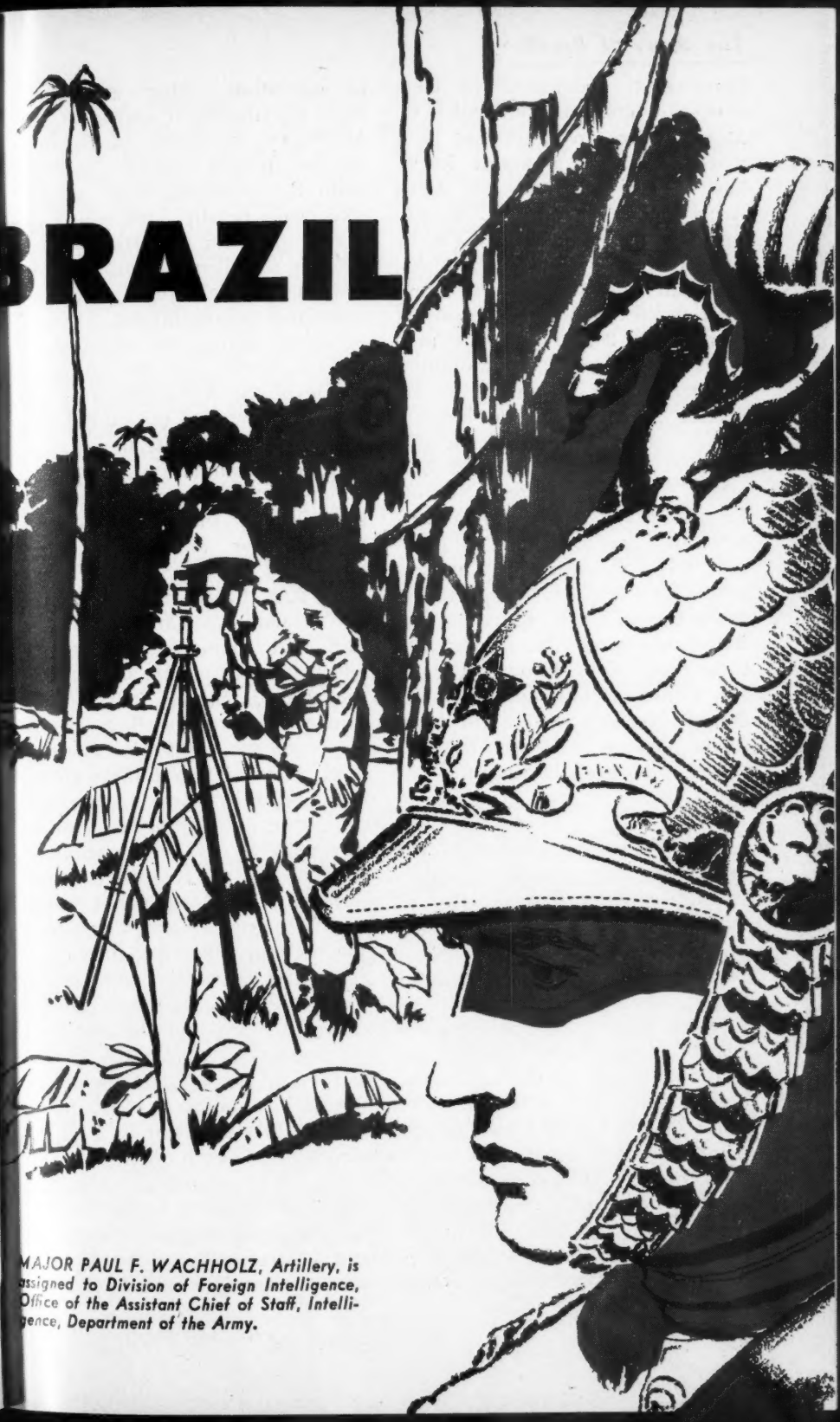
General Caxias, the patron saint of the Army, served Brazil as the warrior who put down revolts and the diplomat who turned revolters into loyal subjects during the period of the Empire, 1822-1899. The crowning military service of Caxias to his country was the defeat of the Paraguayan dictator, Francisco Solano Lopez. This defeat ended a bitter five-year war in 1870. August 25th, the anniversary of Caxias' birth in 1808, is celebrated today as the "Day of the Soldier."

General Rondon, best known in the United States as companion of President Theodore Roosevelt on his Amazon expedition in 1913, spent most of the 50 years of his Army service (1890 to 1940) erecting telegraph lines through Brazil's remote interior. The Service for the Protection of the Indians is the result of Rondon's understanding of and affection for the Indians during these years. An independent government agency, the Service is staffed by people sworn to offer their own lives rather than to inflict physical injury on the aborigines entrusted to their protection.

AS reflected in the lives of Caxias and Rondon, the principal activities of the Army during Brazil's first century of independence were the political consolidation of its immense area, garrisoning of the border outposts, development of its communications, and bringing civilization to the underdeveloped regions of the interior. Only once within the last century was the Army called upon to defend Brazil's continental borders. This call came when the Paraguayan forces of dictator Francisco Solano Lopez invaded the State of Matto Grosso in 1864. This invasion precipitated the Paraguayan War (1865-1870) which ended in the complete annihilation of the dictator's forces by the Brazilians under Caxias.

Although Brazil did not take an active military part in World War I, it made legal common cause with the United States and the Allies by its declaration of war against Germany in October 1917. In World War II, a Brazilian Expeditionary

BRAZIL



MAJOR PAUL F. WACHHOLZ, Artillery, is assigned to Division of Foreign Intelligence, Office of the Assistant Chief of Staff, Intelligence, Department of the Army.

Force under command of General João Baptista Mascarenhas de Moraes (now in retirement as a marshal) fought alongside its allies of the multi-national Fifth Army in Italy. During 239 continuous days of action in the snow and bitter cold of the Apennines, Brazilian soldiers, far away from their tropical homeland, captured more than 20,000 German prisoners and suffered 2,500 casualties.

Brazil's most recent action reflecting its acceptance of international commitments was the dispatch of the Brazilian "Suez Battalion" to the United Nations Emergency Force on the Gaza Strip between Egypt and Israel in January 1957. A volunteer force, its personnel were selected from elements of the capital's Army garrison. The Battalion joined other United Nations Forces from Canada, Colombia, Denmark, Finland, India, Indonesia, Norway, Sweden and Yugoslavia. Average strength of the Battalion has been maintained at about 600.

ACTIVE participation in World War II not only gave Army leaders valuable experience in modern warfare but impressed upon Brazil's leadership and its people the necessity for maintaining the nation's armed forces in readiness in our troubled times. Since 1945 the Brazilian Army has modernized its educational system, tactical doctrines, organization and training. The Army budget for 1959 calls for expenditures of approximately 20 billion *cruzeiros* which, converted at current exchange rates, totals approximately $145,000,000.

Brazilian Army officers are products of a comprehensive system of education. After graduation from the three-year course at the Military Academy of *Agulhas Negras* (called "Black Needles" from the beautiful, dark, needle-like peaks nearby), the young officer is given the opportunity for a lifetime of military education and training for high-ranking staff and command responsibilities. He progressively attends the school of his arm or service and the advanced course of the Arms School at the *Villa Militar,* near the capital.

Selected on the basis of stiff competitive examinations, captains, majors and lieutenant colonels later attend the Army General Staff College or the Technical School at *Praia Vermelha,* the beautiful Red Beach at the foot of Rio's famous Sugar Loaf. After staff and command assignments, selected Army officers may attend the Armed Forces Staff College course with brother officers of the Navy and the Air Force. The top-level National War College course is attended by both military and civilian leaders at the *Escola Superior de Guerra.* These two high-level courses are conducted at historic Fort São João (Saint John) near the entrance to Guanabara Bay, harbor of Rio de Janiero.

Tactical doctrines taught at the Arms School and the General Staff College closely parallel those of their sister schools in the United States but are adapted to Brazil's specific requirements and capabilities. Brazilian and U. S. Army officers attend each others' staff colleges on a reciprocal basis; Brazilian officers have served at Fort Leavenworth as guest instructors, and as co-editors of the *Military Review* which is circulated in

Brazil in a Portuguese edition.

The Brazilian Army is organized on a territorial basis into four Army Zones and a special command for the Amazon area. The Army Zones are divided into ten Military Regions with headquarters in the larger cities. The Army's units range in size and type from airborne, armored, cavalry and infantry divisions stationed near population centers and vital areas to independent platoons on Brazil's distant borders. According to published, unofficial estimates average peacetime strength of the Brazilian Army is about 200,000.

ALL Brazilian males between the ages of 21 and 45 are subject to military duty under a selective service system. One year of this service is active duty in Army ranks. This active year, followed by 8 more years in the reserves, constitutes the "first line" service. The following fourteen years of the reserve obligation is known as the "second line" or inactive reserve period. The one-year recruit is normally assigned to an active unit near his home for his military training.

In a recent survey of an artillery unit near Rio, the average recruit was found to be 18 years old, 5 feet 5 inches tall, and weighing 129 pounds. High school and college students usually satisfy their military training assignments by service in Reserve Officers Training units (CPOR). Because of the

Songfests staged by Brazilian troops like this group in Italy using their native musical instruments were popular morale boosters during World War II.

great distances and transportation costs, recruits are normally given their basic training at the highest military echelon stationed in the vicinity of their homes. For example, the Infantry Battalion Headquarters at a distant coastal or interior station gives basic training to the recruits assigned to the unit and then reassigns them to the individual companies upon completion of their training. The training program is established at the Army General Staff level for the whole army.

Selected trainees are offered the opportunity for a career as noncommissioned officers or specialists. They continue their military education at enlisted specialist or noncommissioned officers' schools. Competition for assignments to the Military Academy as officer cadets is exceptionally keen. Entrance is based on rigorous physical and educational competitive exams.

Among the physical requirements of officers and sergeants for assignment to the Airborne Division are ability to climb a 13-foot rope without using legs or feet, to carry 110 pounds for 100 meters in 30 seconds and to run 5 kilometers (3 1/8 miles) in 30 minutes. In June 1958 this unit completed its 100,000th jump in a demonstration of a heavy drop of a 155mm howitzer and 200 paratroopers from C-82 type aircraft.

At his unit messes the Brazilian soldier enjoys the national diet of rice, beans, and dried beef supplemented by fresh milk, fresh meat, fruits and green vegetables. The Brazilian Army's combat ration includes the corned beef hash, frankfurters, soluble coffee and cigarettes so well known to his fellow soldier in the U. S. Army. Distinctively Brazilian items of his ration are chicken paste; canned rice, meat and black beans; and *guava* candy. In common with soldiers the world over, the Brazilian trainee is taller, heavier, stronger and healthier upon return to civilian life after a year in service.

THE principal mission of the Brazilian Army continues to be the defense of Brazil's borders and internal order and security of the nation. In this sense it follows the historic tradition inherited from the Army of Caxias. The tradition of public service and of good relations with its people willed to it by General Rondon also endures.

The Directory of Railroads and Highways under the Director General of Engineers continues its contributions to the economic development of the nation. Its engineer construction battalions labor almost silently, but continuously, in the survey and construction of Brazil's highways and railroads. Such a unit is the Battalion *"Mauá"* working on the construction of the trunk North-South highway through the difficult terrain between Rio and Porto Alegre. Another, the 1st Engineer Group, is combating nature in the Northeast "disaster zone" by constructing reservoirs, irrigation and flood control systems. Of their achievements Arnaud Pierre, a Brazilian journalist from Rio's *O Globo,* writes: "It is only by contact with the unsophisticated interior of Brazil that the soldier really understands his true worth. . . . here he suddenly discovers himself as the teacher, the judge, the counselor and the father, . . . a true soldier of peace."

"Personnel policy" in the Red Army is reflected in

PAY OF SOVIET MILITARY PERSONNEL

MILITARY pay scales in the Soviet Union are adjusted to allow the maximum number of men to be kept in uniform at minimum cost to the state. Soviet Army personnel policy—as reflected in its pay scale—is to retain in service a relatively highly paid, privileged

corps of officers to furnish the professional nucleus for training large numbers of poorly paid conscripts.

No particular effort is made to recruit enlisted men for extended service. Of the estimated 2,500,000 men in the Soviet Ground Forces at present, roughly 83 percent are conscripts, 14 percent are officers, and the remaining 3 percent are reenlisted soldiers.

Annual enlisted pay ranges from 360 rubles for a private in his first two years of service to 1800 rubles for a conscript master sergeant. In the third year of service, the pay is doubled for every grade except Pfc and private. (*See Table 1.*) At 10 rubles to the dollar this amounts to $3 a month or 10 cents a day for the private. (For the purchase of consumer goods, an exchange rate of 8 to 10 rubles to the dollar is considered fairly representative.)

Food, clothing, shelter, and medical treatment are on about the same low level as the conscript's pay.

Reenlistees are fairly well paid by Soviet standards. A reenlistee private first class, for example, receives roughly seven times as much as his conscript counterpart. Despite the substantial pay increases, however, reports indicate that conscripts are reluctant to reenlist. Moreover, it appears that it is Soviet policy to limit the number of reenlistees.

The base pay for selected examples of Soviet officers with approximate dollar equivalents is shown in *Table 2.* In addition to rank and longevity pay as in the U. S. Army, the Soviet officer also receives additional pay for the duty he performs. Total annual base pay ranges from 56,160 rubles for a major general in command of a division to 17,160 rubles for a senior lieutenant commanding a platoon. If the lieutenant commands a company, he gets an additional 2,400 rubles.

The base pay of a major general is 156 times that of the conscript private in his first two years of service. In contrast, the base pay of

Table 1

ANNUAL PAY OF SOVIET SOLDIERS

	Conscripts					
	1st and 2d Year of Service		3d Year of Service		Reenlistee	
	Rubles	U.S. Dollar Equivalent	Rubles	U.S. Dollar Equivalent	Rubles	U.S. Dollar Equivalent
Master or 1st Sgt	1,800	180	3,600	360	8,400	840
Sgt 1st Class	1,200	120	2,400	240	7,200	720
Sergeant	900	90	1,800	180	6,000	600
Corporal	720	72	1,440	144	4,800	480
Pvt 1st Class	480	48	840	84	3,600	360
Private	360	36	600	60		

Table 2

EXAMPLES OF ANNUAL PAY OF SOVIET OFFICERS

(Assignment rates shown are the average amounts for the command positions indicated)

Rank	*Rubles*	*Assignment*	*Rubles*	*Probable Longevity Pay Rubles*	*Total*	*U.S. Dollar Equivalent*
Maj Gen	19,200	Div Cmdr	24,000	12,960	56,160	5,616
Colonel	15,600	Regt Cmdr	19,200	8,700	43,500	4,350
Lt Col	13,200	Bn Cmdr	14,400	5,520	33,120	3,312
Captain	8,400	Co Cmdr	10,800	2,880	22,080	2,208
Sr Lt	7,200	Plat Cmdr	8,400	1,560	17,160	1,716

a United States officer of comparable rank is about 15 times as much as is paid to a private.

THE standard of living of the Soviet Army officer is higher than that of most Soviet citizens in positions of comparable responsibility. The only exceptions are certain categories of Communist Party officials and highly qualified representatives of the arts and professions. A civilian technician in the U.S.S.R., for example, receives about 11,000 rubles annually; a senior lieutenant, whose responsibilities are theoretically equal, receives 17,160 rubles.

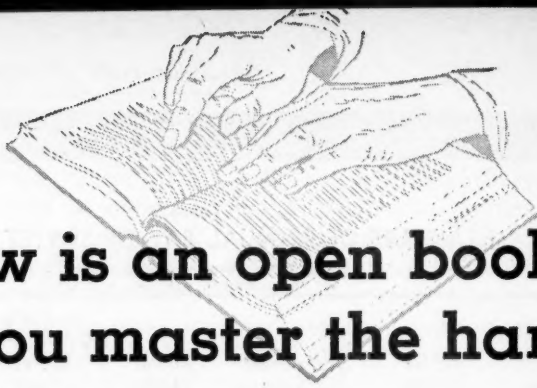
Moreover, the lieutenant can supply the needs of his family at military stores at a much lower rate than the civilian who must buy at regular government stores. When the various other benefits of the Soviet officer, such as free uniforms and allowances for rations and quarters, are considered, the difference between the officer's standard of living and that of the technician is magnified.

Table 3

AVERAGE ANNUAL BASIC PAY OF U. S. ARMY PERSONNEL

(Excluding rental allowance and subsistence where applicable)

Officer		*Enlisted*	
Maj Gen	$16,200	Master or 1st Sgt	$4,308
Col	11,052	Sgt 1st Class	3,864
Lt Col	8,800	Sergeant	2,664
Capt	6,050	Corporal	1,849
1st Lt	4,310	Pvt 1st Class	1,326
		Private	1,081



The Law is an open book . . . if you master the handy

IDENTIFYING

MILITARY personnel—particularly those in staff assignments—who are not members of the legal profession nevertheless have frequent occasion to refer to federal laws by numerical designation or by popular name. One commonly hears reference to "Public Law 85-599," or "10 USC 3201," or "the Smith Act." An understanding of the various terms and the distinctions implicit in each is essential for anyone seeking the specific wording of the many laws and statutes which impinge on every aspect of Army life.

Bill. A proposal for federal legislation becomes a bill when it is introduced in one of the houses of the Congress. At that time it is given a bill number. If first introduced in the House, it may be known as H.R. 900—that is, the nine hundredth bill introduced durthe current Congress in the House. This number continues to be used even after it has been adopted by the House and is being considered by the Senate. If first introduced in the Senate, the designation would be, for example, S. 921.

There are other designations, such as "H.Con.Res." for a concurrent resolution first introduced in the House, "H.J.Res." for a joint resolution first introduced in the House, and "H.Res." for a House resolution.

The Senate has similar type resolutions. A "concurrent resolution" concerns a matter of interest to both houses, usually involving operations, such as a resolution to adjourn on a certain date. A "joint resolution" is very little different from a bill and, if passed by both houses and approved by the President, it becomes a law; but a joint resolution also is used for a Constitutional amendment which must

reference guide for . . .

FEDERAL LAWS

Colonel James K. Gaynor

pass each house by two-thirds, does not require Presidential approval, and must be ratified by three-fourths of the states. A resolution of only one house—usually called a "simple resolution"—concerns the operations only of one house, such as a resolution to consider a certain bill at a specific time.

Act and Enrolled Enactment. After a bill has been passed by one house, it thereafter is known as "an act." After it has been passed by both houses, it is termed an "enrolled enactment." After it has been approved by the President—or after it has passed each house by a two-thirds majority after Presidential veto—it is known as a "Public Law." If applicable only to one or more persons designated by name, it is called a "Private Law."

Public Law. A public law is given a numerical designation by the National Archives and Records Service. It thereafter will be known, for example, as "Public Law 85-599," which means the five hundred and ninety-ninth public law enacted by the 85th Congress. Prior to 1957, the designation was, for example, "Public Law 220, 84th Congress," and such designations still will be found in frequent use.

Public laws first are issued as "slip laws," with a separate pamphlet for each law. It is probable that the term "slip law" came from the fact that most laws are on individual sheets of paper, or "slips."

Statute. At the end of each session of Congress, laws enacted during that session are issued in bound volumes—one volume for public laws (sometimes in two or more

COLONEL JAMES K. GAYNOR, Judge Advocate General Corps, is Chief, Legislative Division, Office of the Chief of Legislative Liaison, Department of the Army.

parts, or separate bindings) and another for private laws. These are entitled "Statutes at Large." After publication of the Statutes at Large, the official reference to a law is to this series. For example, the official reference to the Reserve Officer Personnel Act of 1954 is 68 Stat. 1147, which means that it is in volume 8 of the Statutes at Large, beginning on page 1147.

Code. As soon as practicable after the close of a session of Congress, public laws are codified by the National Archives and Records Service, and take their place in the United States Code. The Code is divided into fifty titles according to subject matter; with the exception of the first six titles, the subjects are alphabetical.

The Code is cited as "U. S. Code" or "USC" and a citation is usually preceded by the title and followed by the section. The provision of title 10 which sets forth the active-duty strength of the Army is section 3201. It may be cited as "title 10, United States Code, section 3201," or as "10 U. S. Code, § 3201" (this is the designation preferred by scholarly legal publications), or simply as "10 USC 3201." The section of the United States Code, it should be noted, often will not be the same as the section of the public law.

There are two unofficial publications of the United States Code—one known as the "United States Code Annotated" (abbreviated USCA), the other as the "Federal Code Annotated" (abbreviated FCA). Citations to these are by title and section, and the titles and sections correspond to the official publication of the Code.

Military Interest. The portions of the United States Code which are of most interest to military personnel are title 5, Executive; title 10, Armed Forces; title 14, Coast Guard; title 32, National Guard; title 50, War and National Defense; and title 50, Appendix, which in effect is an additional title and which includes war and national defense legislation of a somewhat temporary nature.

Titles 10 and 32 were rewritten and enacted as one law in 1956; these appear in volume 70A of the Statutes at Large, which has been issued in pamphlet form. Later military laws were grouped and re-enacted as amendments to titles 10 and 32 by Public Law 85-861, approved 2 September 1958. It is planned to re-enact subsequent amendments into appropriate provisions of titles 10 and 32 about every two years. (Prior to the re-enactment of 1956, title 10 was entitled "Army" and title 34 was entitled "Navy." Title 34 is not obsolete for all purposes, however.)

Popular Names. Many public laws provide, in one of their earlier sections, a popular name by which the law may be known. An example is the "Department of Defense Reorganization Act of 1958." One may find the popular names of laws listed in indexes to the codes, but it must be remembered that "section 105 of the Department of Defense Reorganization Act of 1958" is not the same as the section designation which it will have in the United States Code. One will find occasional reference to a law by the name of the Member of Congress who introduced it—for example, the "Smith Act"—and these, too, may be found in indexes to the codes.

Revised Statutes. An occasional reference will be found to the Revised Statutes. An example of such a citation is "R.S. 1428," which means section 1428 of the Revised Statutes. Except for the few titles of the United States Code which have been enacted into positive law, the official manner of citing a federal law is by volume and page of the Statutes at Large. Where a basic statute was enacted prior to 1878, which was the date of the last revision of the Revised Statutes, the reference is to the Revised Statutes rather than to the Statutes at Large.

Legislative History. The legislative history of a law may be important in its interpretation. In essence, the legislative history consists of a transcript of the hearings before the subcommittee, the transcript of hearings before the full committee, the report of the full committee, these same transcripts and reports in the other house of Congress, and the debates on the floor of each house.

Some of these transcripts and reports are printed, others are not; in some cases, there will be no hearing before a subcommittee, and in some cases there will be no report by either subcommittee or full committee. Printed transcripts and reports are in pamphlet form and must be obtained separately, usually from the committee which considered the proposal.

An unofficial publication, "U.S. Code Congressional and Administrative News," publishes compilations of committee reports periodically (usually bi-weekly) during a session of Congress and in bound volumes after the close of a session. Reports of debates on the floors of the houses will be found in the *Congressional Record* which is published daily while Congress is in session and then periodically compiled in bound volumes.

Defense Legislative Program. Each agency of the Executive Branch of the Federal Government has a responsibility to inform the Congress of legislation needed for the proper functioning of such agency. Within the Department of Defense, a legislative program is prepared prior to each Congress, and the individual proposals are transmitted to Congress with requests for enactment.

A proposal which is a part of the Department of Defense Legislative Program is given a designation by the Department of Defense, such as "DOD 86-15," which means that it is the fifteenth proposal on the program for the 86th Congress.

Language Training in Pentagon

A language maintenance facility which helps improve fluency in foreign languages has been placed in operation in the Pentagon by the Office, Assistant Chief of Staff, Intelligence. Available for use 24 hours a day, the facility consists of a monitoring device, 12 semi-soundproof booths, each equipped with a two-channel tape recorder, and a library of recorded tapes and other instructional material. The user listens to a native voice through earphones, then repeats and records what he hears. In a playback he can compare his performance with that of the native. Training material now is available in 33 languages or dialects.

NEWS of professional interest

Command Changes

Effective 1 July, General Lyman L. Lemnitzer assumed duties as Army Chief of Staff, succeeding General Maxwell D. Taylor, retired.

In other command changes, General George H. Decker has been named as Vice Chief of Staff, succeeding General Lemnitzer in that post. General Decker was Commanding General, Eighth Army, Commander-in-Chief, United Nations Command, Korea, and Commander, U. S. Forces, Korea. He is succeeded in the Far East by General Carter B. Magruder.

General Charles D. Palmer has been named to replace his brother, General Williston B. Palmer, who will retire in November as Deputy Commander in Chief, U. S. European Command.

Lieutenant General James E. Moore, Deputy Chief of Staff for Operations, succeeds General Cortlandt Van Renssalaer Schuyler as Chief of Staff, SHAPE.

Major General Edward H. McDaniel, Deputy Inspector General, has been named to be The Inspector General, succeeding Major General Albert Pierson, retiring.

Major General Russell L. Vittrup, Deputy Chief of Staff for Plans and Operations, U. S. Army Pacific, Hawaii, succeeds Major General John H. Michaelis as Chief of Legislative Liaison, Office of the Secretary of the Army. General Michaelis has been assigned to U. S. Army, Alaska.

Brigadier General Clifton F. von Kann, assistant division commander of the 82d Airborne Division, becomes Director of Army Aviation.

Appointment of Mr. Richard S. Morse as Director of Research and Development of the U.S. Army has also been announced.

Soviet Violations Cited

A consistent record of broken treaties from the earliest days of the Communist accession to power is detailed in Department of Defense Fact Sheet 1-H, "Soviet Treaty Violations." Issued by the Office of Armed Forces Information and Education and currently being distributed Army-wide, the Fact Sheet includes a checklist of the numerous agreements concluded by the Soviet regime and contrasts these with the violations, evasions and invasions that have resulted. The pamphlet quotes the findings of a study at the Hoover Library in California that "The Soviet Union's theories about the performance of treaty obligations are shaped entirely by national necessity, never by international ethics or interests in human welfare."

Language Testing

In the first program of its kind since 1949, all Army personnel who have a language qualification will be re-tested to determine their current ability to read or understand the language. Objective is to produce an accurate inventory of the Army's linguist assets, establish a reporting procedure to keep the inventory up to date, and to establish a machine records file to meet routine and emergency requirements for linguist assignments. Details of the plan are contained in AR 611-6 and Department of the Army Circular 611-36 dated 7 May 1959.

Project Saturn Engine

Four times more powerful than any other American flight-tested propulsion system, the first of eight liquid propellant

rocket engines to provide a first stage booster for Project Saturn has been delivered to Redstone Arsenal, Huntsville, Alabama. The Saturn space vehicle project is being developed by the Advanced Research Projects Agency.

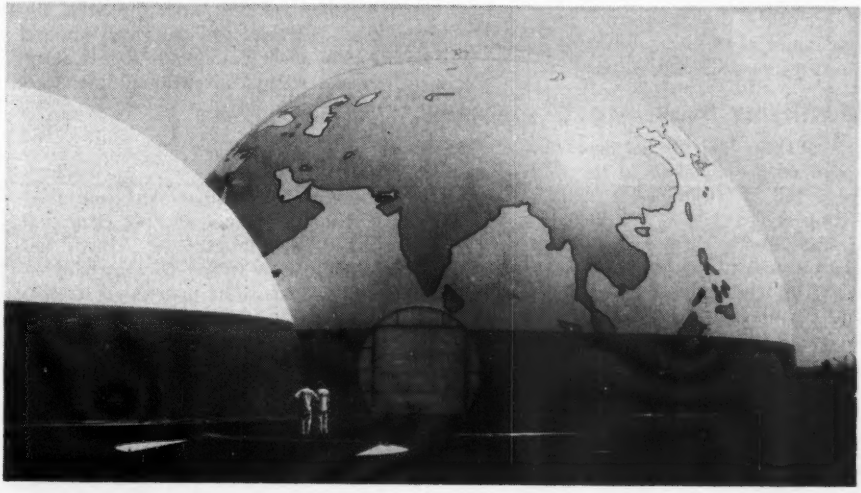
Used in clusters of eight, the engines will develop 1,500,000 pounds of thrust. The engine, designated the H-1, is a modification of existing Jupiter and Thor engines. It was developed by Rocketdyne, division of North American Aviation, Inc., under supervision of the Army Ballistic Missile Agency.

Miniaturization Advances

Two devices developed by the Diamond Ordnance Fuze Laboratories, Washington, D. C.—an electric light slightly larger than a pinhead, and a radio transmitter the size of a pencil eraser—have recently received national awards for achievement in the field of miniaturization. The lamp, only three one-hundredths of an inch in diameter and a tenth of an inch long, will find use in dials, endoscopes, and medical probes for examining cavities in scientific and industrial research, and in optical systems requiring a near-point light source. The transmitter is used in ballistic studies to determine temperature of an artillery shell in flight and relay the information back to ground receivers.

Airborne Trench Digger

Designed to provide rapid protection for troops, an airborne mechanical ditch digger capable of digging a trench 4 feet deep, 24 inches wide at 12 feet per minute, now is undergoing tests at the Army Engineer Research and Development Center, Fort Belvoir, Virginia. Mounted on rubber tires, it is capable of road speed of 35 miles per hour. It is designed to support earthwork operations on construction projects, dig ditches to six feet depth, excavate machine gun emplacements or foxholes.



BELIEVED the largest air-supported structure ever built for military use, a hemispherically shaped missile maintenance shelter called the Pentadome has been developed to accommodate missiles during inspection and maintenance operations. Towering 85 feet high, the vinyl-coated nylon shelter is about 150 feet broad at the base. Held in place by anchors driven into the ground around its perimeter, it can withstand winds of 70 miles an hour and even stronger gusts. It can be erected by ten men in a day after the anchorage system is installed. The new Pentadome was developed by Army Quartermaster Corps in cooperation with Army Ordnance Corps. First public showing was at Andrews Air Force Base, Washington, D. C., on Armed Forces Day.

Physical Fitness Test

Completion of the physical fitness test by 2,100 men at Fort Benning, Georgia, has concluded the pilot testing and set into motion the field testing of the new exercises. The test, devised by the Combat Conditioning Committee of the Ranger Department, eliminates the customary squat-jump and pull-up comprising the usual physical fitness tests. It substitutes five events designed to determine more accurately the individual's readiness for combat in the field—horizontal ladder, dodge-run-jump, low crawl, mile run and grenade throw.

Air to Ground Pictures

Contracts have been let for development of an aerial reconnaissance system capable of taking, processing and transmitting aerial photographs to a ground station for immediate viewing. Fairchild Camera and Instrument Company is to develop the new system, capable of producing a photographic reproduction on the ground within two minutes after being taken from an aircraft. Army Signal Corps is in charge of the program, which incorporates new concepts in electronic data handling, rapid processing and display techniques.

Identifying Marksmen

New shoulder and hat cords have been approved for members of the U. S. Army Advanced Marksmanship Unit at Fort Benning, Georgia. They are royal blue, trimmed with serrated bands of white, red and white. The shoulder cord will be worn on right shoulder of both winter and summer uniform while the hat cord is for the campaign hat used in match competitions by rifle and pistol teams.

Efficiency Reporting

When officers are withdrawn from normal rating channels to participate in a field maneuver, submission of letter-type efficiency reports now is required under a recent change in officer efficiency reporting regulations. A letter will be submitted on each officer withdrawn from normal rating channel for more than 15 but less than 60 days to participate in a major maneuver. The report is forwarded to the parent organization for attachment as an inclosure to his next scheduled efficiency report.

NATO Missile Units

Recent activation of four missile units of the new West German Air Force at the U. S. Army Ordnance Guided Missile School, Redstone Arsenal, Alabama, brings to an even dozen the number of North Atlantic Treaty Organization missile units formed at the "Space Academy."

At about the same time, two complete sets of Nike guided missile equipment—including radars, launchers, vans—were delivered to Nike battalions of two other countries, Norway and Denmark, in ceremonies at Fort Bliss, Texas. The presentations mark the readiness of the Norwegian Air Force and the Danish unit to join other air defense units of NATO.

Disposable Paper Clothing

Extensive tests have begun in the use of disposable paper-base clothing items at Brooke Army Medical Center, Fort Sam Houston, Texas. Planned by the Quartermaster General in cooperation with The Surgeon General, the tests are part of a comprehensive program in cooperation with members of the paper industry. Paper-base medical and surgical apparel could help meet emergency logistical requirements when conventional linens are in short supply.

Swimming Mule

Members of the 101st Airborne Division's Recondo School at Fort Campbell, Kentucky, have taught the Army's mechanical mule to swim—by two field expedient methods. The first way is to drive the mule onto a 15x15 foot tarpaulin, fold the sides of the tarp over and tie them. This provides sufficient buoyancy to allow the mule to be floated across a stream. A second method is to lash four small logs together alongside the frame of the vehicle, attach four air mattresses to the extending corners, and again the mule can be floated. The Recondo School offers a two-week course in ranger, commando and advance reconnaissance methods.

Army Tan

The Army's summer semi-dress uniform will be known as Army Tan, in keeping with policy for modernizing Army symbolism and terminology.

Enlisted Collegian

Sergeant Robert D. Shelton, an Army Signal Corps noncommissioned officer, became the first enlisted man to graduate under the Army's college training program when he received his Bachelor of Science degree in Electrical Engineering from Virginia Polytechnic Institute, Blacksburg, Virginia.

Under auspices of the program started in 1958, enlisted men may volunteer for up to four years of civilian college training in technical, scientific or managerial fields. Those accepted for one year are required to enlist for a three year period; those selected for two years to enlist for six years. A third and fourth year of training toward a degree may be requested during the last six months of obligated enlistment service. Sergeant Shelton, of Franklin County, Virginia, is to be assigned to the U. S. Army Electronic Proving Ground, Fort Huachuca, Arizona, as electrical-electronic engineering assistant.

Allied Students

The Allied Liaison Section of the U. S. Army Infantry School, Fort Benning, Georgia, reports that 39 countries are represented among the 325 Allied students, ranging in rank from sergeant to colonel, who attend the School.

Bibliography on Soviets

A bibliography containing some 1,300 selected references has been prepared by the Army Library to present available information concerning Soviet military power. Books and articles published in many magazines, American, foreign and Russian, are included. The bibliography, entitled *Soviet Military Power* is issued as Department of the Army Pamphlet No. 20-65.

AFSWP to DASA

The agency formerly known as the Armed Forces Special Weapons Project has been redesignated as Defense Atomic Support Agency, effective 6 May.

Keeping Current With the

CONTEMPORARY MILITARY READING PROGRAM

A synopsis of selected books included in the Army Contemporary Military Reading List of professional interest to Army members.

AMERICAN STRATEGY IN THE ATOMIC AGE *by George Cooper Reinhardt, University of Oklahoma Press, 1955, 236 pp. $3.75.*

This book, by a retired Army colonel, presents a bold blueprint for long-range plans aimed at thawing out the Cold War, calling for buildup of independent economic and military strength of the Free World while encouraging resistance behind the Iron Curtain.

DIRECTION OF WAR *by Edgar James Kingston-McCloughry, Praeger 1955, 261 pp. $4.*

Air Marshal Kingston-McCloughry has prepared a book primarily about British problems in the field of military-civilian relationships, maintaining that new circumstances of war have rendered Britain's military power marginal, and advocating that Britain maintain scientific lead over any enemy war potential.

REALITIES OF AMERICAN FOREIGN POLICY *by George Frost Kennan, Princeton University Press, 128 pp. $2.75.*

Career diplomat Kennan, in a series of four lectures at Princeton University, presents his personal philosophy of foreign policy, exploring our relations with the non-Soviet world, through which he contends United States must work for both containment and liberation.

The Army Carves a Path for Progress

WHERE once adventurous *coureurs de bois* pushed bark canoes through foaming rapids, deep-draft ocean vessels soon will be bringing increased traffic of the world to Great Lakes cities.

Thus the dream of opening the Great Lakes—greatest inland waterway system in the world—will come true as the U. S. Army Corps of Engineers pushes to completion the huge project of deepening and improving the Great Lakes Connecting Channels. These narrow, shallow links between the lakes are being deepened to 27 feet, primarily to accommodate domestic traffic; however, the improvement will also permit the benefits of deep sea traffic to be spread throughout the Great Lakes system. It will enable ocean-going vessels to negotiate a 602-foot climb "uphill" from the Atlantic Ocean to Duluth, Minnesota.

Started in May 1957, the project essentially is a job of removing some 65,000,000 cubic yards of earth and rock. It also calls for construction of new locks at famed Sault St. Marie Canal. All in all, it exceeds by far any previous undertaking during the 133-year experience of the Corps of Engineers on the Great Lakes.

IN ADDITION, the Corps of Engineers concurrently is improving Chicago's Calumet-Sag channel to provide better connection between the Mississippi River and Lake Michigan, via the 327-mile Illinois Waterway. The channel at Chicago will be widened from its present 60 feet to 225, with a 9-foot depth.

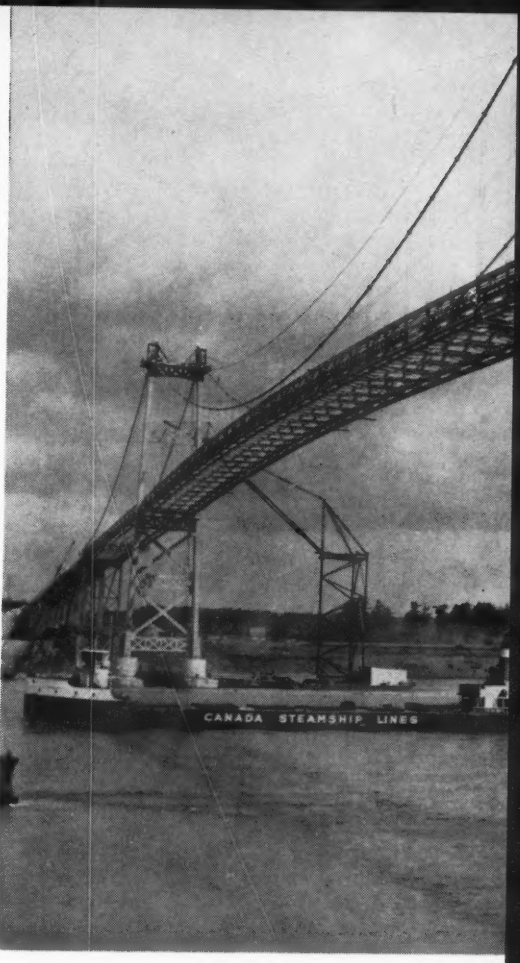
The St. Lawrence Seaway itself was a joint undertaking of the United States and Canada. The United States portion was conducted by the St. Lawrence Seaway Development Corporation, with the Corps of Engineers as design and construction agents.

When both jobs are finished the Great Lakes navigation system and its links with the Atlantic Ocean and Mississippi River will provide an inter-connected waterway system reaching from Montreal to Mexico via the Gulf Intra-coastal Waterway, from Pittsburgh to Sioux City, from Duluth to ports all over the world.

Although in terms of earth moved, the Channel improvement project will be only about a fourth that of the Panama Canal—opened just 45 years ago after completion by the Corps of Engineers—the result in terms of tonnage and economic import to the Nation will be comparable.

Thus within half a century, the Army will have hewn three strategic links of utmost significance to the Nation's commerce, industry and defense—the Panama Canal, the Alcan Highway, and the Great Lakes inland waterway system.

DISTRIBUTION:
See Army Circular 310-71 (18 June 1959) which directs Commanders to request sufficient copies to permit prompt circulation, using DA Form 12 (Requisition for Initial Distribution of Publications).



"The Great Lakes navigation system and its links will provide an interconnected waterway system reaching from Montreal to Mexico, from Pittsburgh to Sioux City, from Duluth to ports all over the world."